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1	**HONOLULU HIGH CAPACITY TRANSIT CORRIDOR PROJECT**
2	**RISK REGISTER - NOVEMBER 2010**
3	**REV: 0**
4	Note: (1) Risk Rank is based upon assessed pottential delay to 2019 Project ROD
5	(2) Cost impact is based upon direct and indirect pottential costs - where cost mitigates schedule delay then schedule score refects this
6	**Risk ID**
7	
8	**PROJECT WIDE RISKS**
9	322
10	326
11	379

	B	C	D	E	F	G	H
1							
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6	**SCC Code**	**SCC Level2 Description**	**Risk Group**	**Risk Type**	**FTA Risk Category**	**FTA Risk Category Description**	**Segment**
7							
8							
9	10.04	Guideway: Aerial structure	DCR	GEN	E	Construction	Project wide
10	10.04	Guideway: Aerial structure	DCR	GEN	E	Construction	Project wide
11	20.02	Aerial station, stop, shelter, mall, terminal, platform	POL	GEN	A	Requirements	Project wide

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6	**Risk Description**	**Comments & Notes**
7		
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9	Construction equipment related accidents cause delays to project (ex. crane falls over, etc.)	Sept. 2010 Update: Cost would be for the deductible under OCIP.
10	Unforeseen archeology results in work stoppage and / or relocation of columns and foundations.	Possible relocation of columns to avoid relocation of ancient burial. All column locations will be pot holed prior to main drilling of shafts with about 6' depths and 8' wide area. Worst case perhaps resulting in an 'insitu section' and perhaps relocation of travelling gantry to by-pass this section.
11	Station Bathroom design criteria presented to the public is unacceptable and results in additional bathrooms.	New Risk in Sept. 2010 Update. Baseline station design currently assumes unisex bathrooms but community requests separate bathrooms.

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6	**Schedule Risk Assessment Notes**	**November 2010 Comments & Notes**
7		
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9	Grouped with Risk 326	In addition to accidents, safeguarding construction equipment should be considered; loss or theft of equipment may also be likely to result in delays.
10	Inserted as a discrete risk at the end of each segment to allow for low probability (5%) but potentially high impact. Risks could impact any time in the schedule however would have the same end result of delaying that particular segment	Pot holing should be scheduled far enough in advance of construction in order to plan for change in girder lengths/post-tensioning/configuration without delay to project
11	Believed covered in 'ranges' on base durations. The schedule base durations have been 'ranged' based upon a -5% of the Original Duration equaling the Optimistic, +5% of the Original Duration equaling the Most Likely and +10% of the Original Duration equaling the Pessimistic.	Identify if bathrooms are provided for employees or patrons. Separate bathrooms may be required if public.

	M	N	O	P	Q	R	S	T	U	V	W
1	Legend	Low (1)	Med (2)	High (3)	Very High (4)	Significant (5)					
2	Probability	< 10%	10><50%	> 50%	75% ><90%	>90%					
3	Cost	< $250K	$250K><$1M	$1M><$3M	$3M><$10M	>$10M					
4	Schedule	< 1 Mths	1 ><3 Mths	3><6 Mths	6><12 Mths	> 12 Mths					
5	Rating	< =3	3.1-9.49								
6	Cal Prob	Prob Rating	Cost Impact	Time (Delay to 2019 Project ROD)	Risk Rating (w/ 2019 Delay)	Time (Duration)			Status (A = Active; X = NA)	Active	
7										A	
8											
9	10%	1	2	2	2	2			A	1	
10	10%	1	5	4	4.5	4			A	1	
11	10%	1	3	1	2	1			A	1	

	X	Y	Z	AA	AB	AC	AD	AE	AF	AG	AH
1					Risk Rating						
2											
3											
4											
5											
6											Risk Order Based ON ACCESS REPORT
7	**LOW**	**MED**	**HIGH**		Minor Threat	Average Threat	Significant Threat				
8											
9	1	FALSE			✔						1
10		2				✔					2
11	1	FALSE			✔						3

	A
12	377
13	304
14	329
15	340
16	445
17	446

	B	C	D	E	F	G	H
12	20.07	Elevators, escalators	POL	GEN	A	Requirements	Project wide
13	90.00	Unallocated - all SCC's	DCR	GEN	B	Design	Project wide
14	90.00	Unallocated - all SCC's	FUN	GEN	A	Requirements	Project wide
15	90.00	Unallocated - all SCC's	UNP	GEN	B	Design	Project wide
16	90.00	Unallocated - all SCC's	FED	GEN	B	Design	Project wide
17	90.00	Unallocated - all SCC's	FED	GEN	B	Design	Project wide

	I	J
12	Elevator design criteria presented to the public is unacceptable and results in additional elevators.	New Risk in Sept. 2010 Update. Currently have 1 elevator per station and community preferences would like more than 1.
13	FTA may not grant an LONP for Final Design before approving Entry into Final Design.	Sept. 2010 Update: Additional Risks added See #445 and 446 Viewed as 20% risk that FTA will not allow FD to progress under an LONP - Generally no LONP's can be issued prior to entry into FD. WOFH would have to proceed at risk under local funding however raising sufficient funds to cover this and other scope required under an LONP may prove impossible and delay subsequent phases / contracts possibly incurring additional 'delay costs' from contractors.
14	Scope may be increased based on lessons learned from initial contracts (Ex. Betterment, station access, utility scope, etc.)	Most likely to impact City Center, and Airport segments ; Traffic diversions, street closures etc may be particularly impacted by need to relocate utilities outside of station foot print area which may mean into the middle of the adjacent street.
15	Contractors may not achieve contract required delivery dates of design information and construction interfaces to others.	LD's may be insufficient to cover claims from those interface contractors.
16	FTA may not grant an LONP for Construction prior to FFGA.	New Risk in Sept. 2010 Update. Split out from Risk #304.
17	FTA may not grant an LONP for Construction before approving Entry into Final Design.	New Risk in Sept. 2010 Update. Split out from Risk #304.

	K	L
12		One elevator per station will impact mobility impaird access if elevator is out of service. Need for two elevators remains a cost and design schedule risk. Comments state one escalator per station, this is incorrect. Current drawings issued show up to four escalators per station. For type A and C stations, two on each side of the guideway from plaza to platform level. Calculations should be performed to determine maximum patron flow rates on these escalators to determine the true peak travel requirements for each station. Escalator calcs should be based on projected peak service headways and patron throughput expectations. Some stations may require additional escalators to meet higher demand usage, such as at the airport and university stops. Current drawings issued show a minimum of two elevators per station to meet ADA requirements. One elevator on each side of the guideway. This provision would be suitable only if the elevators have sufficient carrying capacity for both handicap, bikes and children's carriages. The elevator requirements will be linked to the carry on policy implemented.
13	The assumption is that entry into FD is only required prior to signing of the 'for construction drawings' and this could be delayed until after bids had been received for construction based upon final design documentation (awaiting to be signed off). On this basis no risk of delay was considered appropriate to the model	
14	This risk has been modeled to reflect the potential end of project final testing and commissioning challenges that may arise following changes and refinements during the course of start-up of intermediate segments. The risk has been given a 65% likelihood of a possible one to two month delay to the cost likely with an outside chance of a six months delay in starting up the system and moving into full revenue operations (Activity 931 refers)	
15	Believed covered in 'ranges' on base durations. The schedule base durations have been 'ranged' based upon a -5% of the Original Duration equaling the Optimistic, +5% of the Original Duration equaling the Most Likely and +10% of the Original Duration equaling the Pessimistic.	
16	Incorporated as a discrete risk event. Potentially 3-18 months delay but low probability	
17	Grouped with Risk 445	

	M	N	O	P	Q	R	S	T	U	V	W
12	10%	1	5	1	3	1			A	1	
13	10%	1	5	2	3.5	2			A	1	
14	50%	3	3	3	9	3			A	1	
15	20%	2	5	2	7	2			A	1	
16	10%	1	5	4	4.5	4			A	1	
17	10%	1	5	3	4	3			A	1	

	X	Y	Z	AA	AB	AC	AD	AE	AF	AG	AH
12	1	FALSE			✓						4
13		2				✓					5
14		2				✓					6
15		2				✓					7
16		2				✓					8
17		2				✓					9

	A
18	458
19	72
20	452
21	448
22	294
23	190
24	246
25	412
26	319

	B	C	D	E	F	G	H
18	90.00	Unallocated - all SCC's	UNP	GEN	E	Construction	Project wide
19	90.00	Unallocated - all SCC's	DCR	GEN	A	Requirements	Project wide
20	90.00	Unallocated - all SCC's	CFR	GEN	C	Market	Project wide
21	90.00	Unallocated - all SCC's	FUN	GEN	A	Requirements	Project wide
22	90.00	Unallocated - all SCC's	UNP	GEN	E	Construction	Project wide
23	40.08	Temporary Facilities and other indirect costs during construction	DCR	ROW	E	Construction	Project wide
24	60.01	Purchase or lease of real estate	ROW	ROW	A	Requirements	Project wide
25	40.03	Haz. mat'l, contam'd soil removal/mitigation, ground water treatments	UNP	ENV	E	Construction	Project wide
26	40.03	Haz. mat'l, contam'd soil removal/mitigation, ground water treatments	DCR	ENV	D	Geotech/ Early Construction	Project wide

	I	J
18	Strike by shipping contractors may impact delivery of materials.	New Risk in Sept. 2010 Update.
19	The overall project design is incomplete and significant requirements risks still exist.	General risk and picks up allowance for 'design development' contingency in all sections
20	Lack of bidders could increase costs.	New Risk in Sept. 2010 Update. As each contract is progressed, the risk increases. As lack of bidders becomes an issue, we will work to mitigate.
21	5307 Funds may not be allocated City Council to the project - $305 Million	New Risk in Sept. 2010 Update. 5307 helps to fund the preventive maintenance of TheBus. (We can ask for about $25 million a year).
22	Unforeseen exceptional weather may impact project.	Delays due to weather can be reflected in a refined Integrated Master Project Schedule, which should be monitored and assessed.
23	Hawaiian Housing and Finance Development Corp. (state agency) owns this property and they may be in construction of a new housing project while HHCTC is in construction which would require additional coordination.	June 2010 - Location to be advised - This is a local issue - maintaining access is assumed to be possible but constraints on the Contractor need to be investigated to address the potential costs involved and any impact to the schedule
24	Dedicated City Real Estate staff is limited and depending on future city needs, adequate resources may not be available and could cause delays.	Currently in the process to hire a real estate consultant to perform purchases, relocations, and property management. (Cost estimate for Consultant if $3 Million for 5 years)
25	General compliance issues may lead to higher costs - contaminated to HAZMAT	New Risk in Sept. 2010 Update. HDOT would need to become involved if HAZMAT was found. Originally assumed contaminated materials may be determined to be HAZMAT which would need to be sent to main land, change of land use.
26	Excavated materials may be classed as Hazardous and require special disposal.	Sept. 2010 Update: In contracts that if HAZMAT is found, the city will be required to direct contractors. Possible increases in costs ; EG in Banana plantation property area - unable to bore hole in this area due to properties not yet purchased / demolished ; If HAZMAT is found then City has to take control of disposal / treatment - in normal circumstances this would then be issued back to contractor as a change order but may delay works awaiting a decision and will result in additional costs.

	K	L
18	Grouped with Risk 326	
19	No schedule impact recorded however design and other changes are somewhat accounted for in risk ranges applied to all activities	
20	Covered in activity ranges however it was not believed likely there would be a 're-bid' and any 'bust' in the engineers estimate would have to be met from contingency	The packaging and evaluation of proprosals for the CSC contract will force some secondary, yet extremely important, systems elements to be compromised as major, trustworthy vendors may not be a part of the selected CSC contract. Teaming arrangements and integration of system elements becomes more risky and requires more scrutiny by the client.
21	Would occur same time as FTA issues and believed incorporated with these risk probabilities and duration impacts (see 326/445 and 446)	
22	Grouped with Risk 326	
23	In general ranges - see Risk 340 for full description	
24	No schedule impact identified	
25	Grouped with Risk 326	
26	Grouped with Risk 326	

	M	N	O	P	Q	R	S	T	U	V	W
18	25%	2	3	2	5	2			A	1	
19	50%	3	5	0	7.5	0			A	1	
20	50%	3	5	0	7.5	3			A	1	
21	25%	2	5	0	5	5			A	1	
22	10%	1	4	2	3	2			A	1	
23	25%	2	1	1	2	1			A	1	
24	90%	5	3	0	7.5	0			A	1	
25	10%	1	2	2	2	2			A	1	
26	10%	1	3	2	2.5	2			A	1	

	X	Y	Z	AA	AB	AC	AD	AE	AF	AG	AH
18		2				✔					10
19		2				✔					11
20		2				✔					12
21		2				✔					13
22	1	FALSE			✔						14
23	1	FALSE			✔						15
24		2				✔					16
25	1	FALSE			✔						17
26	1	FALSE			✔						18

	A
27	418
28	416
29	411
30	409
31	408
32	406
33	472

	B	C	D	E	F	G	H
27	40.04	Environmental mitigation, e.g. wetlands, historic/archeological, parks	UNP	ENV	A	Requirements	Project wide
28	40.04	Environmental mitigation, e.g. wetlands, historic/archeological, parks	POL	ENV	B	Design	Project wide
29	40.04	Environmental mitigation, e.g. wetlands, historic/archeological, parks	UNP	ENV	D	Geotech/ Early Construction	Project wide
30	40.04	Environmental mitigation, e.g. wetlands, historic/archeological, parks	UNP	ENV	B	Design	Project wide
31	40.04	Environmental mitigation, e.g. wetlands, historic/archeological, parks	UNP	ENV	B	Design	Project wide
32	40.04	Environmental mitigation, e.g. wetlands, historic/archeological, parks	FED	ENV	B	Design	Project wide
33	10.04	Guideway: Aerial structure	DCR	CIV	B	Design	Project wide

	I	J
27	Unforeseen requirements/stipulations may be added into ROD over and above what is currently in FEIS.	New Risk in Sept. 2010 Update. Additional mitigations, etc.
28	City is unable to process the potential comments from Section 106 Consulting Parties in a timely manner and are not in compliance with the Programmatic Agreement (PA) which could cause delays to project.	New Risk in Sept. 2010 Update. Section 106 Consulting Parties (over a dozen) are any group that may have an interest in the project - historical societies, architects, etc. Their comments do not have to be taken into consideration - only require appropriate documentation. They have 45 days from the time they receive the documentation plan to send in their response.
29	Specific burial treatment plan needed if iwi are uncovered and may remain uncertain until iwi are found and may result in project delays.	New Risk in Sept. 2010 Update. Decision has yet to be made as to if reinternment is acceptable or if burial in place is required. Once iwi is found a final decision will be required but it could take a while for an agreement to be made. Project wide but particular issues are believed to be in Segment 4 - Civic Center Station. Utility trenches are more likely to uncover iwi.
30	For the Clean Water Act the city expects to get a 404 Nationwide Permit but depending on the Contractors' changes they may be required to get an individual permit which could cause delays to the project.	New Risk in Sept. 2010 Update. Once the ROD has been given it will be up to the Contractor to receive the required individual permits since impacts to the waters will be due to their specific changes which could delay the project.
31	Archaeological inventory survey will not be done for the entire alignment, prior to any construction, which could lead to legal actions and may delay the project until the entire survey has been completed.	New Risk in Sept. 2010 Update. Belief that since the surveys were not previously done the entire alignment would be different than it currently stands. Planning to have all EIS and surveys complete prior to the start of most construction - however, construction will have been already started in West Oahu. From time of ROD it could take up to a year to conclude the total survey. Plan to have all studies complete prior to completion of Final Design.
32	Permits and approvals by other agencies are not provided in a timely manner and delay the project - FAA, FHWA, Navy, DLNR, USACE.	New Risk in Sept. 2010 Update.
33	HDOT reviews of Interstate Crossings are not provided in a timely manner and delay the project. (WOFH, Kamehameha and Airport Guideway Segments)	New Risk Nov. 2010: Breakout from Risk #406 to specifically identify HDOT approvals delays.

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27	Grouped with Risk 326	
28	Grouped with Risk 326	
29	Believed covered in risk 406 and also in other risks dealing with iwi impacts	
30	Included within range and likelihood applied to Risk 406	
31	Grouped with Risk 326	
32	Obtaining permits in a timely manner poses significant risk to early contracts however does not directly impact the 2019 Policy schedule opening date. A discrete risk has been incorporated which does impact initial Segments (see Activity 116)	
33	Obtaining permits in a timely manner poses significant risk to early contracts however does not directly impact the 2019 Policy schedule opening date. A discrete risk has been incorporated which does impact initial Segments (see Activity 116)	

	M	N	O	P	Q	R	S	T	U	V	W
27	10%	1	3	1	2	1			A	1	
28	10%	1	1	2	1.5	2			A	1	
29	10%	1	2	3	2.5	3			A	1	
30	10%	1	5	5	5	5			A	1	
31	10%	1	5	5	5	5			A	1	
32	90%	5	2	2	10	2			A	1	
33	50%	3	2	2	6	2			A	1	

	X	Y	Z	AA	AB	AC	AD	AE	AF	AG	AH
27	1	FALSE			✔						19
28	1	FALSE			✔						20
29	1	FALSE			✔						21
30		2				✔					22
31		2				✔					23
32			3				✔				24
33		2				✔					24

	A
34	473
35	419
36	404
37	407
38	325
39	387

	B	C	D	E	F	G	H
34	10.04	Guideway: Aerial structure	DCR	CIV	B	Design	Project wide
35	40.04	Environmental mitigation, e.g. wetlands, historic/archeological, parks	UNP	ENV	B	Design	Project wide
36	40.04	Environmental mitigation, e.g. wetlands, historic/archeological, parks	UNP	ENV	A	Requirements	Project wide
37	40.04	Environmental mitigation, e.g. wetlands, historic/archeological, parks	UNP	ENV	A	Requirements	Project wide
38	40.02	Site Utilities, Utility Relocation	DCR	UTI	B	Design	Project wide
39	40.02	Site Utilities, Utility Relocation	UNP	UTI	A	Requirements	Project wide

	I	J
34	Additional staffing costs incurred due to adoption of Transit Authority.	New Risk Nov. 2010: Need to review possibility for adjustments due to Adoption of Transit Authority. Salary increases are a possibility due to transition into a Transit Authority. Current estimate assumes an annual 3% salary increase but there has actually been a 5-10% salary decrease.
35	Code changes may result in longer spans over water courses to avoid interference with flood basin, additional flood storage capacity, regrading or combination of.	New Risk in Sept. 2010 Update.
36	Revision to current environmental documentation to incorporate any change in the project and/or identified scope not specifically covered in the EIS delays project and increases costs.	New Risk in Sept. 2010 Update. Assumptions that EIS would not be changed and money would mitigate any delay. Prior to ROD, HRS 343 (as opposed to NEPA) does not provide ability to supplement document to describe and evaluate potential impacts of off alignment scope (Ex. PCC Casting Yard) requiring entire process to be forced back into public consultation.
37	Supplemental Environmental documents may be required due to scope that was not covered in the FEIS and may cause delays to the project.	New Risk in Sept. 2010 Update. Post ROD risk (lay down yard, move station) - no schedule delay since there would be enough time to receive supplemental documents.
38	There may be insufficient Utility company resources available to meet the design, approvals and / or construction schedule.	This is a large project with many Utility relocations - the existing Utility companies may be unable to ramp up staff sufficiently to meet the contractors schedule and cause delays which the contractor may feel he can claim as a change order. Somewhat mitigated by City / Utility companies placing Electrical relocations direct with Kiewit and future contractors.
39	More fiber optic cable lines than estimated may need to be relocated (number of cables in ducts to be relocated not known).	New Risk in Sept. 2010 Update.

	K	L
34		Delays in filling key positions could cause some changes of direction with regard to management of project. This could affect cost and schedule.
35	No schedule impact identified	
36	No schedule impact identified	
37	No schedule impact identified	
38	In general ranges - see Risk 340 for full description	In addition to the risks noted, if utility companies are doing any of their own relocations or betterments, there is limited control over their work and they often proceed to their own schedule and not the schedule of the project.
39	In general ranges - see Risk 340 for full description	A contingency must be included to mitigate against unknown utility impacts. Further extensive work can be carried out at cost to determine more accurately the alignment, location and condition of utilities. Surveying and research should be carried out as early as possible during preliminary engineering to more accurately determine the true level of risk. Typically as part of the PE this risk is reduced through the review of requirements definition and subsequent partial re-scoping to address any specific utility related issues. Agreements must be set in place with utility companies to facilitate this process and develop optimal, workable and accurate relocation plans, de-risking the potential for subsurface 'unknowns'. MCA's can be developed that transfer the risk of 'unknowns' to the utility provider, as this is clearly their area of responsibility for accurate drawings and information.

	M	N	O	P	Q	R	S	T	U	V	W
34	50%	3	4	0	6	0			A	1	
35	10%	1	3	0	1.5	0			A	1	
36	50%	3	5	0	7.5	0			A	1	
37	90%	5	3	0	7.5	0			A	1	
38	50%	3	4	3	10.5	3			A	1	
39	25%	2	4	3	7	3			A	1	

	X	Y	Z	AA	AB	AC	AD	AE	AF	AG	AH
34		2				✔					24
35	1	FALSE			✔						25
36		2				✔					26
37		2				✔					27
38			3				✔				28
39		2				✔					29

	A
40	385
41	384
42	366
43	109
44	471
45	392
46	397

	B	C	D	E	F	G	H
40	40.02	Site Utilities, Utility Relocation	UNP	UTI	D	Geotech/ Early Construction	Project wide
41	40.02	Site Utilities, Utility Relocation	FED	UTI	E	Construction	Project wide
42	40.02	Site Utilities, Utility Relocation	UNP	UTI	D	Geotech/ Early Construction	Project wide
43	40.02	Site Utilities, Utility Relocation	UNP	UTI	A	Requirements	Project wide
44	40.02	Site Utilities, Utility Relocation	DCR	UTI	A	Requirements	Project wide
45	40.02	Site Utilities, Utility Relocation	DCR	UTI	A	Requirements	Project wide
46	40.02	Site Utilities, Utility Relocation	DCR	UTI	B	Design	Project wide

	I	J
40	Old electrical and other utilities in ducts may contain asbestos and City may insist asbestos is removed.	New Risk in Sept. 2010 Update. Only would occur if are unable to leave abandoned utilities in place. Known to exist - risk is if City says remove all asbestos and existing ductwork
41	IF HDOT Use and Occupancy Agreement with utility owners is needed it could delay utility relocations in the state ROW.	New Risk in Sept. 2010 Update. State has yet to look at design drawings and it could take up to 2 years to receive agreements. However, the HDOT's Use and Occupancy Agreement with utility owners have not been successfully negotiated in the past, and the inclusion of the FHWA as a party to the UA might be of a concern.
42	The Contractor may sever one or more Utilities during construction resulting in a stoppage of work and impacting not only themselves but other concurrent contractors.	September 2010 Update: Assume most costs will be covered by insurance. Accidents tend to have a ripple impact depending on how they are caused to general working constraints, protection of existing utilities and their users from damage and outages and the safety implications that may result.
43	Agreements with all Utility Owners are not yet in place and subsequent agreements may expose the City to unforeseen costs and schedule impacts.	June 2010 - reworded from: Utility Agreements are not in place with private or public owners, including the military. This may impact location of relocations, continuity of supplies and who does what - there is however a detailed schedule of who will be responsible for utility design and relocations.
44	Current assumption that new utilities can be carried in, along, under existing bridge structures may not be allowed.	Some structures already over loaded. If unable to be carried on structures alternate methods would be required and could increase costs. Ex. expensive purpose built pipe, cable bridges, and/or directional drilled pipe/cable conduit under obstruction may required.
45	Ongoing/upcoming city and or state projects may require modifications to utility relocation designs.	New Risk in Sept. 2010 Update. This applies to not only City projects, but other State or utility projects. Will need constant input from all parties for future projects.
46	Roadway redesign may require additional utility relocations (expansion of curblines, etc.)	New Risk in Sept. 2010 Update.

	K	L
40	In general ranges - see Risk 340 for full description	
41	Believed covered in Risk 406 and also in other Risks dealing with Utility and Highway agreement impacts	
42	Grouped with Risk 326	
43	Believed covered in risk 406 and also in other risks dealing with Utility impacts	MCA's should be in place during PE phase and are required to assist in reducing risks during this period, gaining support of the utility companies and defining areas of responsibility so that risks can be correctly allocated to the entity responsible.
44	No schedule impact identified	All 'new' utilities being replaced must be considered betterments. As such all betterments should be paid for by the COH or private utility co. Agreements can be made to address partial division of funding, however this must all be included in the baseline costs estimate. MCA's are required to support these negotiations. If the utility is directly related to the new guideway provision, it should be incorporated and fully funded by the project. An example would be short line AC power distribution and feeders. Any existing utility must remain the concern and property of the respective owner. There is to be no transferring of ownership or responsibilities. Demarcation points should also be defined as part of the MCA's.
45	In general ranges - see Risk 340 for full description	
46	Believed covered in Risk 406 and also in other risks dealing with Utility and Highway agreement impacts	

	M	N	O	P	Q	R	S	T	U	V	W
40	75%	4	4	1	10	1			A	1	
41	35%	2	3	3	6	3			A	1	
42	50%	3	2	2	6	2			A	1	
43	25%	2	4	3	7	3			A	1	
44	10%	1	3	0	1.5	0			A	1	
45	50%	3	3	2	7.5	2			A	1	
46	10%	1	4	4	4	4			A	1	

	X	Y	Z	AA	AB	AC	AD	AE	AF	AG	AH
40			3				✔				30
41		2				✔					31
42		2				✔					32
43		2				✔					33
44	1	FALSE			✔						34
45		2				✔					35
46		2				✔					36

	A
47	393
48	394
49	378
50	375
51	83

	B	C	D	E	F	G	H
47	40.02	Site Utilities, Utility Relocation	DCR	UTI	A	Requirements	Project wide
48	40.02	Site Utilities, Utility Relocation	DCR	UTI	B	Design	Project wide
49	20.02	Aerial station, stop, shelter, mall, terminal, platform	DCR	STR	B	Design	Project wide
50	20.02	Aerial station, stop, shelter, mall, terminal, platform	DCR	STR	A	Requirements	Project wide
51	20.02	Aerial station, stop, shelter, mall, terminal, platform	DCR	STR	B	Design	Project wide

	I	J
47	HDOT may require minimum 42" (rather than current estimate of 36") cover to Utilities	New Risk in Sept. 2010 Update. Deeper trenches, more cover, more likelihood of hitting other utilities and / or HAZMAT
48	The traffic management Plan approval may compromise the Utility relocation schedule.	New Risk in Sept. 2010 Update.
49	Additional costs may arise through **simple** stations and guideway integration.	September 2010 Update: Risk divided into 2 risks, complicated and simple stations. Simple stations would include Ho'opili - and do not have a lot of interface between station and guideway.
50	Platform screen doors have yet to be determined and could result in changes to the station design.	New Risk in Sept. 2010 Update. Currently not in the core systems contract but expect it to be in contract.
51	Additional costs may arise through **complicated** stations and guideway integration.	September 2010 Update: Risk divided into 2 risks, complicated and simple stations. Complicated Stations may require bridges to be hung from guideway. Would require rework to fit. Refab of bridge structures where it attaches to guideway, adjustment to baring points. Drawings reflect integration between station supports and segmental guideway, but guideway and stations are to be constructed under two separate contracts - Guideway Superstructure Study - Summary Report; p. 16; Fig. I I and 13.

	K	L
47	In general ranges - see Risk 340 for full description	All replacements and changes due to changes in building codes and local city standards etc. must be considered betterments, viewed and resolved in the same way. Sanitary sewer pipe sizing, drainage requirements and changes in 10, 50 year and 100 year flood event tables, must also be addressed. The specifications should be clear on the standards being used and fixed to mitigate against the risk of future code changes impacting final delivery to regulatory compliance.
48	Believed covered in Risk 406 and also in other risks dealing with Utility and Highway agreement impacts	
49	In general ranges - see Risk 340 for full description	
50	In general ranges - see Risk 340 for full description	Inclusion of PSDs should be resolved prior to entering Final Design. This risk is multiplied by inclusion of langauge in the CSC BAFO; it would seem that the CSC contractor must provide for interface to PSDs and be prepared to contract for their inclusion. What are the criteria for determining their inclusion and what efforts have been made to estimate their cost and schedule impact? The decision to use PSD's will impact station designs. If PSDs are being cited as a requirement, station and systems designs cannot be complete PE unless they absorb this new additional subsystem. This will impact station plans and necessitate recalculation of passenger flows at stations for modeling. For a fully ATC based system PSD's can be seen to provide additional benefits to safety and performance, far out weighing the implementation costs. Once the decision has been made either way, this risk will be closed out.
51	In general ranges - see Risk 340 for full description. Station logic also changed to assume, for the purposes of risk analysis, all stations can start at same time and progress concurrently given flexible resources. Their overall duration is more sensitive and the time required to complete systems installations, cost impacts however are likely to be more variable.	

	M	N	O	P	Q	R	S	T	U	V	W
47	50%	3	5	1	9	1			A	1	
48	25%	2	3	3	6	3			A	1	
49	10%	1	2	2	2	2			A	1	
50	90%	5	2	1	7.5	1			A	1	
51	25%	2	3	3	6	3			A	1	

	X	Y	Z	AA	AB	AC	AD	AE	AF	AG	AH
47		2				✔					37
48		2				✔					38
49	1	FALSE			✔						39
50		2				✔					40
51		2				✔					41

	A
52	381
53	19
54	429
55	172
56	455
57	252
58	270
59	273

	B	C	D	E	F	G	H
52	20.02	Aerial station, stop, shelter, mall, terminal, platform	DCR	STR	B	Design	Project wide
53	10.04	Guideway: Aerial structure	UNP	CIV	A	Requirements	Project wide
54	10.04	Guideway: Aerial structure	DCR	CIV	B	Design	Project wide
55	20.02	Aerial station, stop, shelter, mall, terminal, platform	DCR	CIV	A	Requirements	Project wide
56	50.02	Traffic signals and crossing protection	UNP	CIV	A	Requirements	Project wide
57	80.00	Preliminary Engineering	CFR	COM	A	Requirements	Project wide
58	80.06	Legal; Permits; Review Fees by other agencies, cities, etc.	LEG	COM	A	Requirements	Project wide
59	90.00	Unallocated - all SCC's	POL	COM	A	Requirements	Project wide

	I	J
52	Fare gate study could impact current station design.	New Risk in Sept. 2010 Update. Currently not in the core systems contract but expect it to be in contract.
53	High sections of guideway may be significantly impacted by wind delaying schedule increasing exposure of City to claims.	For example, there are areas that are over 60 feet above ground level, some that cross flood plains for example.
54	36" Width of walkway may be increased if safety officer will not accept 9" gap between train car and walkway.	New Risk in Sept. 2010 Update. Widening the walkway for a total of 18" has not solved the height issue of exiting the train at 43". This cost will not be significant since it would compensate for the plinths being removed.
55	Bus shelters may be added to scope and increase project cost.	Sept. 2010 Update: Risk updated to specificly include only changes of scope particular to bus shelters.
56	HDOT may require replacement of all existing traffic signal equipment with new.	New Risk in Sept. 2010 Update. Raised by Keith Niiya
57	Soft costs - design, program, construction and Agency management may be under estimated depending on schedule following ROD announcement.	Update June 2010 - Significant area of cost increase on other projects - often times underestimated in the beginning.
58	Un-anticipated litigation may add cost to the Project (e.g., protests from adversary groups, community groups, adjacent landowners, and other affected parties).	Combating any claims from Contractors will also have to be covered under this budget allocation.
59	FTA may not allow 5307 Funds to be allocated in the financial plan which delays Entry into Final Design.	Sept. 2010 Update: additional risk added - See #448

	K	L
52	In general ranges - see risk 340 for full description	Consideration of fare gates must include traffic patterns and consideration of whether/where CCTV will be placed and at least initial ideas on how and by whom fare payment will be enforced Determining Fare Policies and methods is critical in station design and infrastructure preparation. Detail on considerations and various alternatives under consideration have not been shared with the PMOC. Is City in a position to at least determine the station and CSC contract needs to impement one or two alternatives? The fare collection policy should be established and fixed before PE is complete, as station designs and AFC subsystem design concepts will be baselined against the FC policy.
53	Minor weather delays covered in 'ranges' on activity durations	
54	No schedule impact identified	Has the eliminaion of track plinths in the WOFH been addressed in relation to this risk?
55	No schedule impact identified	
56	Not anticipated to impact guideway construction, station construction or opening as would be developed during detailed design - minor schedule impacts covered in 'ranges'	Where ITS traffic controllers and associated equipment is replaced or upgraded must be considered a betterment. In some cases it will not require an upgrade only reconfiguration. Reconfiguration is a project cost. HDOT to fund any statutory upgrades due to changes in standards etc as true betterments. HHCTCP to fund any changes due to new functionality requirements and interfaces. Likely to become a 50/50 cost split.
57	No schedule impact identified	Management of contract changes related to station design, Fare Collection system, platform screens, signal/ATC system, etc. is likely to escalate the later these decisions are made. The PMOC is concerned about the ongoing management of construction and implementation of a "loosely defined" transit system.
58	No schedule impact identified	
59	Refer to Risks 445 and 446 - covered in general and discrete concurrent risk events	

	M	N	O	P	Q	R	S	T	U	V	W
52	25%	1	1	1	1	1			A	1	
53	10%	1	2	2	2	2			A	1	
54	30%	2	1	0	1	0			A	1	
55	90%	5	3	0	7.5	0			A	1	
56	70%	3	3	3	9	3			A	1	
57	90%	5	5	0	12.5	0			A	1	
58	90%	5	5	0	12.5	0			A	1	
59	10%	1	5	5	5	5			A	1	

	X	Y	Z	AA	AB	AC	AD	AE	AF	AG	AH
52	1	FALSE			✓						42
53	1	FALSE			✓						43
54	1	FALSE			✓						44
55		2				✓					45
56		2				✓					46
57			3				✓				47
58			3				✓				48
59		2				✓					49

	A
60	444
61	344
62	290
63	**WEST OAHU/ FARRINGTON HIGHWAY RISKS**
64	405
65	321
66	451
67	317

	B	C	D	E	F	G	H
60	90.00	Unallocated - all SCC's	POL	COM	B	Design	Project wide
61	90.00	Unallocated - all SCC's	UNP	COM	B	Design	Project wide
62	90.00	Unallocated - all SCC's	FUN	COM	C	Market	Project wide
63							
64	40.04	Environmental mitigation, e.g. wetlands, historic/archeological, parks	DCR	GEN	B	Design	WOFH
65	90.00	Unallocated - all SCC's	DCR	GEN	B	Design	WOFH
66	90.00	Unallocated - all SCC's	CFR	GEN	B	Design	WOFH
67	90.00	Unallocated - all SCC's	DCR	GEN	E	Construction	WOFH

	I	J
60	Delays due to integration of new government entities.	New Risk in Sept. 2010 Update. City Council is to have 5 of the 9 members replaced by voters in November (3 being replaced were Pro-Rail) Voter to choose if they want a Transit Authority - this will give them more control of everything and project will not need to solely rely on City Council. New Mayor and New Governor will need to also be brought up to speed and need to get specific people on board.
61	Insufficient City resources to respond to contractors requests for change orders and claims leads to force accounting.	Would need to go to force account which would lead to additional costs - 25% over negotiated change order
62	Escalation may be higher than projected.	Steel, concrete, rail, aggregate, fuel and all construction materials may increase in price due to volatile and unpredictable market conditions. Current estimates and projected inflationary factors must more definitively reflect actual industry and material
63		
64	An injunction resulting from a legal challenge may take place after ROD, which would stop construction and cause delays.	September 2010 Update: Anti Rail lobby could launch a legal protest delaying project further. Temporary injunction would cause a delay of a few weeks. A permanent injunction would delay the schedule until the issue is resolved.
65	Late provision of design information for station structures.	Exposure exists with interface with other packages, Kiewit will require details of final design of stations layouts to complete and construct stations columns and foundations ; failure to provide information in a timely manner may result in claims from Kiewit ; Farrington station design required by Kiewit at 126 days after NTP, see SP-10.4 for other station latter dates
66	City may require design changes to DB submittals resulting in formal change orders.	New Risk in Sept. 2010 Update. Risks broken down by DB Contract Segments. See Risks #312, 449, 450, and 451.
67	City supplied materials may not be provided as per contract.	Sept. 2010 Update: Extremely unlikely this would happen - currently no indication materials will not be available but continuing delays to ROD / NTP could change things.

	K	L
60	Believed covered in Risk 406 and also in other risks dealing with Utility impacts	
61	In general ranges - see Risk 340 for full description	
62	No schedule impact identified	
63		
64	This issue would overlap LONP and the likelihood of it happening at the same time is high. The risk is therefore considered covered in other risks and would be a duplicate and double count if added as a separate discrete risk	
65	In general ranges - see Risk 340 for full description	This is a classic example of embedded risk. The late delivery of station designs will impact station structures and construction, however will also impact the schedule for systems integration within stations and the design review milestones may go back. This risk will give rise to a series of nested risks relating to systems sub contracts / designs falling under and having dependencies upon higher level structures designs. These embedded risks may need to be broken out, listed and managed separately as independent risks. As way of example PSD's on platforms being dependent upon station designs and station system interfacing requirements.
66	In general ranges - see Risk 340 for full description	
67	In general ranges - see Risk 340 for full description	

	M	N	O	P	Q	R	S	T	U	V	W
60	75%	4	0	2	4	2			A	1	
61	65%	3	3	0	4.5	0			A	1	
62	10%	1	5	0	2.5	0			A	1	
63					0						
64	30%	2	5	0	5	5			A	1	
65	25%	2	3	0	3	2			A	1	
66	90%	5	4	0	10	3			A	1	
67	10%	1	2	0	1	1			A	1	

	X	Y	Z	AA	AB	AC	AD	AE	AF	AG	AH
60		2				✔					50
61		2				✔					51
62	1	FALSE			✔						52
63											**52.2**
64		2				✔					53
65	1	FALSE			✔						54
66			3				✔				55
67	1	FALSE			✔						56

	A
68	302
69	300
70	374
71	443
72	431
73	432

	B	C	D	E	F	G	H
68	90.00	Unallocated - all SCC's	DCR	GEN	C	Market	WOFH
69	90.00	Unallocated - all SCC's	DCR	GEN	A	Requirements	WOFH
70	20.02	Aerial station, stop, shelter, mall, terminal, platform	ROW	ROW	B	Design	WOFH
71	60.01	Purchase or lease of real estate	ROW	ROW	B	Design	WOFH
72	60.01	Purchase or lease of real estate	ROW	ROW	B	Design	WOFH
73	60.01	Purchase or lease of real estate	ROW	ROW	B	Design	WOFH

	I	J
68	Price escalation of "materials in short supply" increases over 10% of bid base	Any increase in index over 10% of asphalt, cement, Portland cement, reinforcing steel, structural steel, galvanized steel, and pre stressed post tensioned strands
69	Delay to issue NTP results in claims for additional costs.	Nov. PMOC Over the Shoulder- 2015 Schedule Delay increased from 0 to 2. Delay Claim will cover up to NTP in March 2011. Kiewit is being delayed because of NTP for next phase, claims for delay are being submitted and total cost to Client is unknown at this time. Renegotiation of contract may involve adjustment of base material prices and the like.
70	Currently designed realignment of easement at West Loch Station has not been accepted by adjacent property owners and could result in design delays if unaccepted.	New Risk in Sept. 2010 Update. Potential impact to Core Systems. West Loch Station has easement through the site that was established in the 1960s. Looking to realign current easement but are unable to work with local property owners until ROD so they currently do not know if this is acceptable.
71	Relocation of business at W. Loch Station may take longer than anticipated.	New Risk in Sept. 2010 Update. Have 15 months from ROD to acquire property. Since it is a business, it is different from private dwellings, and only need to offer 3 alternate locations and only need to give 90 days notice for them to move (included in schedule). However, there is equipment that needs to be relocated and it could take longer than anticipated - 12 hydraulic lifts.
72	Properties at Pearl Highlands Station and Guideway may be more difficult than currently assumed, increasing costs and ROW schedule. (Banana Patch)	Nov. PMOC Over the Shoulder- Cost reduced from 5 to 4. New Risk in Sept. 2010 Update. For all properties at Banana Patch - have a base of about $9 million for acquisition and relocation. Have allowed 15 months from ROD in Dec. 2010. Delay could add an additional 12 months.
73	Properties for Pearl Highlands Park and Ride and H-2 Ramp may be more difficult than currently assumed, increasing costs and ROW schedule. (Banana Patch)	Nov. PMOC Over the Shoulder- Cost reduced from 5 to 4. New Risk in Sept. 2010 Update. For all properties at Banana Patch - have a base of about $9 million for acquisition and relocation. Have allowed 15 months from ROD in Dec. 2010. Delay could add an additional 12 months.

	K	L
68	No schedule impact identified. There is some schedule risk here however it is viewed as a contractors problem to resolve and this would be by paying for alternative approved materials and / or expediting materials in other ways to avoid damages being applied under the contract terms	
69	No schedule impact identified	
70	Incorporated as a discrete risk event. 65% Likelihood with a potential impact on the WOFH schedule of between 3 and 6 months. (refer to Activity 542)	
71	Incorporated into Risk 374	There is no requirement to offer three sites for a business. That requirement is for residences. However, there does need to be a good faith showing of assistance if they are ever going to get a judge to evict a business.
72	Incorporated as a discrete risk event. 90% Likelihood with a potential impact on the Pearl Highlands Station Car Park structure only of between 6 and 24 months.	There must be a firm plan for Banana Patch residents, including available housing. The risk seems to say there is a 90% chance of not making it, which is not acceptable.
73	No schedule impact identified	

	M	N	O	P	Q	R	S	T	U	V	W
68	20%	2	5	0	5	0			A	1	
69	100%	5	5	0	12.5	2			A	1	
70	50%	3	2	0	3	3			A	1	
71	50%	3	3	0	4.5	3			A	1	
72	90%	5	4	0	10	5			A	1	
73	90%	5	4	0	10	0			A	1	

	X	Y	Z	AA	AB	AC	AD	AE	AF	AG	AH
68		2				✔					57
69			3				✔				58
70	1	FALSE			✔						59
71		2				✔					60
72			3				✔				61
73			3				✔				62

	A
74	220
75	318
76	399
77	400
78	413
79	461
80	111

	B	C	D	E	F	G	H
74	60.01	Purchase or lease of real estate	ROW	ROW	A	Requirements	WOFH
75	10.04	Guideway: Aerial structure	DCR	GEO	D	Geotech/ Early Construction	WOFH
76	40.04	Environmental mitigation, e.g. wetlands, historic/archeological, parks	DCR	ENV	D	Geotech/ Early Construction	WOFH
77	40.04	Environmental mitigation, e.g. wetlands, historic/archeological, parks	CFR	ENV	B	Design	WOFH
78	40.04	Environmental mitigation, e.g. wetlands, historic/archeological, parks	UNP	ENV	D	Geotech/ Early Construction	WOFH
79	40.02	Site Utilities, Utility Relocation	UNP	UTI	D	Geotech/ Early Construction	WOFH
80	40.02	Site Utilities, Utility Relocation	ROW	UTI	E	Construction	WOFH

	I	J
74	May need to buy property for Park and Ride at UH West Oahu.	Sept. 2010 Update: Development is on hold due to land use designation from agriculture to urban. Will not hold up start Revenue Services. - 6 month Delay At the UH West Oahu Station, it was assumed that the developer will donate the land for the park and ride parcel. There is no cost for this parcel included in the base cost estimate.
75	Geological conditions described in GBR vary from encountered conditions which may results in different site condition.	Sept. 2010 Update: Split from #318 into all new risks for all other segments. See Risks #318,447,466, 467 and 468. Overall depth, Artesian water pressure greater than expected, permanent casing longer than expected ; based on average 'worse than GBR' - some footings expected to be less than Bid assumptions (check if is clear what baseline is). Latest bore hole logs may vary considerably from those presented at the time of bid ; this risk also includes risk of hitting obstructions during excavations.
76	Extensive rain could affect construction schedule at Pearl Highlands Station.	New Risk in Sept. 2010 Update.
77	Natural drainage at Ho'opili Station may need to be addressed by project if DR Horton development does not do it which would result in additional costs to the project.	New Risk in Sept. 2010 Update.
78	During excavation for new Utilities, iwi (Archeological human remains) may be found requiring revised alignment for utility relocations on Kamehameha Highway which are likely to incur additional costs and possible schedule delays from Contractor.	New Risk in Sept. 2010 Update. WOFH segment not believed to carry significant risk of iwi.
79	Cost exposure from unexpected utility betterment. (Ex. Underground piping quality may be degraded and require extensive replacement which may not all be offset as betterment)	New Risk in Sept. 2010 Update. Risk Split from #359 into various segments. See Risks #461, 462, 464 and 465. May be considered a lower risk in the WOFH since it has water utility betterments have been included.
80	Delay to utility easement agreements for WOFH contracts may delay access for utility relocations and result in Contractor claims.	Sept. 2010 Update: Split into segments from original Risk #111 to include # 390, 391, and #456. For WOFH there is only 1 private property owner (DR Horton) that has been identified for needed easement.

	K	L
74	No schedule impact identified	Donations are only useful if they actually happen. Why not ask the developer right now to donate with a reversion clause, or handle it as a dedication in exchange for the zoning?
75	Discrete risk incorporated into analysis impacting however only Farrington Way shafts as although Western Oahu may be delayed it is more likely that the Farrington Highway section when interfacing with Highway will be the greatest issue. An 80% possibility of a delay of between 1 and 2 months but up to 3 months has been incorporated	
76	Range on Activity 236 has bee increased at the Pessimistic end to 130 days which would allow for a possible 3 month worst case scenario impact from flooding over the base duration	
77	In general ranges - see Risk 340 for full description	
78	Extended utility relocations are covered in Risk Activity 558 where a 95% likelihood of between a 3 and 6 month delay in completion of Utility relocations has been modeled reflecting a number of risks including this specific risk. Utility delays are assumed to impact station foundations and the East Guideway foundations but not the West guideway foundations	
79	Refer to Risk 413 which incorporates iwi and other related risks that may impact Utilities and follow on activities being guideway and station foundations	
80	Refer to Risk 413 which incorporates iwi and other related risks that may impact Utilities and follow on activities being guideway and station foundations	

	M	N	O	P	Q	R	S	T	U	V	W
74	90%	5	3	0	7.5	0			A	1	
75	75%	4	3	0	6	2			A	1	
76	50%	3	3	0	4.5	2			A	1	
77	90%	5	2	0	5	1			A	1	
78	5%	1	2	0	1	2			A	1	
79	5%	1	3	0	1.5	4			A	1	
80	5%	1	2	0	1	2			A	1	

	X	Y	Z	AA	AB	AC	AD	AE	AF	AG	AH
74		2				✔					63
75		2				✔					64
76		2				✔					65
77		2				✔					66
78	1	FALSE			✔						67
79	1	FALSE			✔						68
80	1	FALSE			✔						69

	A
81	396
82	351
83	323
84	382
85	380
86	383
87	308
88	367
89	372

	B	C	D	E	F	G	H
81	40.02	Site Utilities, Utility Relocation	DCR	UTI	E	Construction	WOFH
82	40.02	Site Utilities, Utility Relocation	DCR	UTI	E	Construction	WOFH
83	40.02	Site Utilities, Utility Relocation	DCR	UTI	E	Construction	WOFH
84	20.02	Aerial station, stop, shelter, mall, terminal, platform	DCR	STR	B	Design	WOFH
85	20.02	Aerial station, stop, shelter, mall, terminal, platform	DCR	STR	B	Design	WOFH
86	20.02	Aerial station, stop, shelter, mall, terminal, platform	DCR	STR	B	Design	WOFH
87	10.04	Guideway: Aerial structure	DCR	CIV	D	Geotech/ Early Construction	WOFH
88	10.08	Guideway: Retained cut or fill	DCR	CIV	E	Construction	WOFH
89	20.02	Aerial station, stop, shelter, mall, terminal, platform	CFR	CIV	A	Requirements	WOFH

	I	J
81	Reduced column spacing proposed by Kiewit may result in additional utility relocations that can not be passed back to Contractor.	New Risk in Sept. 2010 Update. With column spacing now 125-135 instead of 150' more columns and more likely to it utilities . WOFH has some large utilities. Contractors are working to place columns to avoid utilities.
82	State or Board of Water Supply (BWS) may not grant Waiver to leave in place existing utilities to be abandoned that are not impacted by new structures requiring partial or total removal.	Sept. 2010 Update. BWS Comment from change order requests removal of 7,750 LF of water mains. Sandwich Isle is looking to add fiber optiics through water abandoned pipes. Split into segments. See Risks #351, 353, 355, and 389. City / HDOT requires existing abandoned utilities to be removed and not capped and left in pace - waiver may not be granted. Fuel Lines will be removed and are part of the current estimated scope.
83	Costs for Utility relocations may increase if Utility plans have errors or omissions greater than Contract stipulation	Tele Conf June 17th 2010: High degree of confidence in existing survey information, utilities have been checked with manhole cover access and deviations noted and drawings updated with Utility companies. Contractor will be responsible for design of relocations but risk still remains with City where utilities are not as indicated on the plans (variance greater than 5' from marked position) and / or a utility exists which is not on the plans.
84	East Kapolei Station design could change, based on hydraulic study and additional costs may be incurred.	New Risk in Sept. 2010 Update.
85	Waipahu Station is located in the floodplain and the design has yet to be approved by DPP which could result in a 3 to 6 month delay due to redesign.	New Risk in Sept. 2010 Update. DPP gave the ok for the initial design but have yet to issue an approval.
86	UH West Oahu Station design could change, based on hydraulic study and additional costs may be incurred.	New Risk in Sept. 2010 Update.
87	Deflection of shafts at top may be stipulated as not to exceed 1"	Sept. 2010 Update: All other estimates reflect this. W. Oahu bid to Kiewit did not and this additional cost has yet to be determined - less than $250k
88	Segment routes may suffer settlement and general damage (including utilities) to surface due to excessive loads and require replacement and or re-surfacing.	New Risk in Sept. 2010 Update. Split into segments - See Risks #367, 368, 369, and 470.
89	Current assumption that developer adjacent to UH West O'ahu Station will build a roadway bridge and road to access the parking lot and bus transfer facility. If they do not build this it will result in additional costs to project.	UH West O'ahu Station access was assumed to be previously developed. At least 150' long and 4 lanes wide

	K	L
81	Refer to Risk 413 which incorporates iwi and other related risks that may impact Utilities and follow on activities being guideway and station foundations	
82	Refer to Risk 413 which incorporates iwi and other related risks that may impact Utilities and follow on activities being guideway and station foundations	
83	Refer to Risk 413 which incorporates iwi and other related risks that may impact Utilities and follow on activities being guideway and station foundations	
84	No schedule impact identified	
85	In general ranges - see Risk 340 for full description	Provide update on DPP approval for construction of station and parking in floodplain.
86	No schedule impact identified	Provide project definition of potential cost and schedule impact
87	Incorporated into Risk 374	The potential additional cost may be more significant in terms of engineering identification and analysis costs than direct construction cost
88	Incorporated into Risk 374	Most of the alignment is aerial structure on deep foundations. Therefore, there shold be little potential for significant settlement cost.
89	Incorporated into Risk 374	If property owner is providing access, joint access agreement should be negotiated with adjacent property owner.

	M	N	O	P	Q	R	S	T	U	V	W
81	25%	2	3	0	3	2			A	1	
82	50%	3	4	0	6	4			A	1	
83	10%	1	3	0	1.5	3			A	1	
84	10%	1	1	0	0.5	1			A	1	
85	10%	1	2	0	1	3			A	1	
86	10%	1	1	0	0.5	1			A	1	
87	90%	5	1	0	2.5	0			A	1	
88	10%	1	2	0	1	0			A	1	
89	50%	3	4	0	6	0			A	1	

	X	Y	Z	AA	AB	AC	AD	AE	AF	AG	AH
81	1	FALSE			✓						70
82		2				✓					71
83	1	FALSE			✓						72
84	1	FALSE			✓						73
85	1	FALSE			✓						74
86	1	FALSE			✓						75
87	1	FALSE			✓						76
88	1	FALSE			✓						77
89		2				✓					78

	A
90	376
91	371
92	170
93	343
94	198
95	347

	B	C	D	E	F	G	H
90	20.02	Aerial station, stop, shelter, mall, terminal, platform	DCR	CIV	E	Construction	WOFH
91	20.02	Aerial station, stop, shelter, mall, terminal, platform	CFR	CIV	A	Requirements	WOFH
92	40.08	Temporary Facilities and other indirect costs during construction	DCR	CIV	E	Construction	WOFH
93	80.05	Professional Liability and other Non-Construction Insurance	FUN	COM	B	Design	WOFH
94	90.00	Unallocated - all SCC's	FED	COM	A	Requirements	WOFH
95	20.02	Aerial station, stop, shelter, mall, terminal, platform	DCR	SYS	B	Design	WOFH

	I	J
90	With guideway previously constructed at Pearl Highlands Station, constructability issues could arise for Bus Transit Center and Parking Garage.	New Risk in Sept. 2010 Update. Plan to not build overpasses and parking structures until there is a need. Guideway built first and then the station will be built at a later date.
91	Project may be required to build a 1 mile paved street at Ho'opili Station. (Final decision to be made by Toru)	New Risk in Sept. 2010 Update. Ho'opili station area was to be developed by a private developer which has been delayed which has resulted in no access road. Current direction is to design for station - needs finalization.
92	Traffic disruption on Farrington Highway may result in revised constraints imposed by City or HDOT. (Ex. lane restrictions and peak time flow restrictions)	Major traffic mitigation efforts will be required along Farrington Hwy through Waipahu. This is a major artery and may require segmental construction at night and perhaps substructure being pre-cast to minimize traffic disruption.
93	Insurance amount in budget may be insufficient to cover change from OCIP to a CCIP.	This would apply to WOFH, Kamehameha, MSF, Core Systems until OCIP coverage is acquired - Target Mid 2011. Carry contractor's workman's comp in other segments. Coverage quoted as $3.9 Million for WOFH.
94	The responsible entity for state safety oversight in Hawaii has not been assigned or included in estimate.	Sept. 2010 Update: SSO has been designated to be under HDOT. Responsibility within HDOT has not been assigned. If SSO is not on during design period it could become an issue when SSO needs to certify for Revenue Service. Withholding of 5307 Funds.
95	Systems interfaces at Farrington Stations may result in claims delay by Station designer.	Systems contract may not be awarded in a timely manner to be able to be integrated in station designs. Farrington station design required by Kiewit at 126 days after NTP. See SP-10.4 for other station latter dates

	K	L
90	Incorporated into Risk 394	
91	No schedule impact identified	The risk of providing a one mile stretch of paving should be determined as early as possible to more accurately define this risk. This risk carries a high probability. An early decision would resolve and remove this risk.
92	Refer to Risk 413 which incorporates iwi and other related risks that may impact Utilities and follow on activities being guideway and station foundations	
93	No schedule impact identified	
94	Believed covered in Risk 406 and also in other risks dealing with Utility and Highway agreement impacts	Likelihood that HDOT personnel will be unfamiliar with SSO functions; may add to costs by requiring workshop training.
95	In general ranges - see Risk 340 for full description	This risk is generic and applies to all stations. Although must be managed for the Kiewit contract independently. The selected systems at stations will impact station designs and the station design will impact the systems integration side of the CSC. IMP should address this but it carries risk and should be effectively managed as both stations and systems designs develop concurrently during final design.

	M	N	O	P	Q	R	S	T	U	V	W
90	50%	3	2	0	3	2			A	1	
91	10%	1	5	0	2.5	0			A	1	
92	75%	4	4	0	8	2			A	1	
93	90%	5	4	0	10	0			A	1	
94	25%	2	2	0	2	2			A	1	
95	75%	4	1	0	2	2			A	1	

	X	Y	Z	AA	AB	AC	AD	AE	AF	AG	AH
90	1	FALSE			✓						79
91	1	FALSE			✓						80
92		2				✓					81
93			3				✓				82
94	1	FALSE			✓						83
95	1	FALSE			✓						84

	A
96	421
97	**MAINTENANCE AND STORAGE FACILITY RISKS**
98	370
99	450
100	468
101	350
102	352

	B	C	D	E	F	G	H
96	50.01	Train control and signals	DCR	SYS	E	Construction	WOFH
97							
98	10.09	Track: Direct fixation	CFR	GEN	A	Requirements	MSF
99	90	Unallocated - all SCC's	CFR	GEN	B	Design	MSF
100	10.04	Guideway: Aerial structure	DCR	GEO	D	Geotech/ Early Construction	MSF
101	40.03	Haz. mat'l, contam'd soil removal/mitigation, ground water treatments	DCR	ENV	D	Geotech/ Early Construction	MSF
102	40.02	Site Utilities, Utility Relocation	DCR	UTI	E	Construction	MSF

	I	J
96	Late delivery of / or acceptance of civils, structures or guideway contracts may delay systems installations.	Nov. PMOC Over the Shoulder - Cost Reduced from 5 to 3 since total cost of Systems installation for segment is less than $20 million. New Risk in Sept. 2010 Update. Takes into account no intermediate dates and costs pushed up by schedule delays. Risk By Segment - #421, 423,453, 454. 7 stations currently do not have a contractor selected. There is no designer. The civil portion needs to be done prior to the stations can be completed. For the first segment particularly are dependant on ROD.
97		
98	Costs associated with delayed NTP of MSF - rail, building steel fasteners etc.	New Risk in Sept. 2010 Update. Maximum based upon 2% per annum thought to be $700k
99	City may require design changes to DB submittals resulting in formal change orders.	New Risk in Sept. 2010 Update. Risks broken down by DB Contract Segments. See Risks #312, 449, 450, and 451.
100	If varying conditions are encountered at MSF additional costs may result. (Such as ground improvement mitigations like jet grouting.)	New Risk in Sept. 2010 Update. Split from #318 into all Segments. See Risks #318,447,466, 467 and 468.
101	The Navy may not have cleared all contaminated material from the Navy Drum Site.	Tele Conf June 17th 2010: In this event it is assumed that any Contractors claim would be passed from the City to the Navy - this needs confirmation
102	The Utility connections required for the MSF facility may be greater than expected and / or the layout of the final facility required by the Core System contractor may impact the Utility scope and costs.	Tele Conf June 17th 2010: Low risk of additional scope - apparently not likely returned bids will change the layout as currently proposed of the MSF. Viewed as less than 5% contingency requirement for this package on Utilities - the site has been cleared and all existing utilities should have been cut off. Unclear however if Navy removed all redundant Utility pipes (which could be contaminated with gasoline / diesel)

	K	L
96	Schedule Logic modeling delays of ROW, Utilities and GBR associated risks along with duration uncertainty applied to base durations pushes the schedule interface dates out. An additional risk has been incorporated into the schedule to model lower probability impact of additional delays as a consequence of the preceding cumulative delays. The schedule impact identified in this risk is therefore in the main a consequence of earlier risks. The cost impact will be directly associated with the Core Systems contract the 'schedule delay impact' reflecting this potential and consequence (refer Activity 524)	Impact of milestone delays for civil work always impact the systems elements of a major project such as this. There is additional risk for this effort because of the issuance of the CSC contract and its dependence upon several other major contracts. Not only is the coordination effort within the CSC team of vendors significant, it will be increased exponentially by the reuired coordination and integration with so many contractors whose efforts and concentration are not on meeting the ultimate in service date milestones. Any delays to schedule due to late delivery of civil works will impact the CSC systems installation work. This must be managed using float as cannot be determined and will be a program risk throughout. Mitigation is obtained by use of float and good PM. Use of completion bonuses within civils contracts can assist in expediting the schedule to maintain completion milestones ahead of planned schedule. Strategic scheduling of installations works by the CSC will also reduce this risk and having some level of flexibility in the installation program to change tasks out should it be required to maintain the overall schedule.
97		
98	No schedule impact identified	
99	Incorporated into model as Activity 564 - 90% chance of a 3 to 6 months delay primarily arising from incorporation of Core Systems requirements following BAFO and selection process	
100	Included with impact under Risk 350	
101	Potential 4 month delay in earthworks as a 'pessimistic' range limit associated with contamination uses and dealing with soft ground, old utilities and other issues that may come to light in cut and fill operations	
102	Included within range and likelihood applied to Risk 406	

	M	N	O	P	Q	R	S	T	U	V	W
96	70%	4	3	0	6	3			A	1	
97											
98	90%	5	2	0	5	0			A	1	
99	90%	5	4	0	10	3			A	1	
100	20%	2	3	0	3	2			A	1	
101	10%	1	1	0	0.5	1			A	1	
102	5%	1	1	0	0.5	2			A	1	

	X	Y	Z	AA	AB	AC	AD	AE	AF	AG	AH
96		2				✔					85
97											**85.2**
98		2				✔					86
99			3				✔				87
100	1	FALSE			✔						88
101	1	FALSE			✔						89
102	1	FALSE			✔						90

	A
103	459
104	**KAHMEHAMEHA HIGHWAY RISKS**
105	449
106	403
107	435
108	447
109	362
110	395
111	462

	B	C	D	E	F	G	H
103	30.03	Heavy Maintenance Facility	UNP	SYS	F	Start-Up	MSF
104							
105	90.00	Unallocated - all SCC's	CFR	GEN	B	Design	Kam Highway
106	40.04	Environmental mitigation, e.g. wetlands, historic/archeological, parks	ROW	ROW	B	Design	Kam Highway
107	60.01	Purchase or lease of real estate	DCR	ROW	B	Design	Kam Highway
108	10.04	Guideway: Aerial structure	DCR	GEO	D	Geotech/ Early Construction	Kam Highway
109	40.04	Environmental mitigation, e.g. wetlands, historic/archeological, parks	UNP	ENV	D	Geotech/ Early Construction	Kam Highway
110	40.02	Site Utilities, Utility Relocation	DCR	UTI	E	Construction	Kam Highway
111	40.02	Site Utilities, Utility Relocation	UNP	UTI	D	Geotech/ Early Construction	Kam Highway

	I	J
103	Equipment supplied for MSF contract may not meet performance criteria agreed with Core Systems Contractor (As yet not awarded)	New Risk in Sept. 2010 Update.
104		
105	City may require design changes to DB submittals resulting in formal change orders.	New Risk in Sept. 2010 Update. Risks broken down by DB Contract Segments. See Risks #312, 449, 450, and 451.
106	Inability to obtain property access in a timely manner to undertake further environmental studies delays project.	Mitigation now implemented is a biweekly meeting between ROW and enviro to discuss requirements are for investigations. New Risk in Sept. 2010 Update. Ex. Archeology inventory study to be done prior to construction (time frames also are dictated following ROD). Need rights of entry to be able to access properties.
107	Approvals by Navy for the MSF drainage (storm drain) easement that goes through Navy property may take longer than expected and delay construction.	New Risk in Sept. 2010 Update. Civils Comment: There are numerous options to work around a delay and would not cause a delay to schedule. Request for approval by Navy has been in for a year and notice has still not been received and are unsure of how much longer it could take.
108	Geological conditions described in GBR vary from encountered conditions which may results in different site condition.	New Risk in Sept. 2010 Update. Split from #318 into all Segments. See Risks #318,447,466, 467 and 468.
109	During excavation for new Utilities, iwi (Archeological human remains) may be found requiring revised alignment for utility relocations on Kamehameha Highway which are likely to incur additional costs and possible schedule delays from Contractor.	Kamehameha Highway segment not believed to carry significant risk of iwi.
110	Relocation of 10" fuel line and 16" gas line along Kamehameha Highway may be more difficult than expected due to possible time frames for outages, etc.	New Risk in Sept. 2010 Update.
111	Cost exposure from unexpected utility betterment. (Ex. Underground piping quality may be degraded and require extensive replacement which may not all be offset as betterment)	New Risk in Sept. 2010 Update. Risk Split from #359 into various segments. See Risks #461, 462, 464 and 465

	K	L
103	Grouped with Risk 326	This risk of MSF designs not meeting the CSC performance specifications and being compatible with mainline concepts is a major risk created from separating the MSF contract from the mainline civils and systems. There is also an added risk to consider here now that ATO within the MSF has been specified. The MSF design must meet the requirements of any proposed TC system supplied by the chosen CSC. This will also indirectly impact the YCT design and requirements. The MSF design will also be impacted by the requirements of the chosen LRV both for the dynamic envelope and the routine maintenance requirements.
104		
105	Range increased on Activity 192 to represent a worst case scenario of up to a 6 month greater time to complete design than the current schedule envisages	
106	Risk Activity 199 added and modeled at 35% likelihood of a 3 to 6 month delay in property acquisitions (impacting only this segment however)	
107	No schedule impact identified	
108	Sub surface / Geotechnical risk ranged as an 80% likelihood of a 3 to 6 month delay in this segment (Refer Activity 576)	
109	Risk Activity 570 addresses potential impacts of concurrent and connected Risks 362,395,462,118,353,354. Modeled as a 35% likelihood of a 3 to 6 months delay with up to a 1 year delay	
110	See Risk 362 - concurrent and related risk impacts of iwi and Utilities grouped together	
111	See Risk 362 - concurrent and related risk impacts of iwi and Utilities grouped together	

	M	N	O	P	Q	R	S	T	U	V	W
103	25%	2	3	0	3	2			A	1	
104											
105	90%	5	4	0	10	3			A	1	
106	25%	2	4	0	4	3			A	1	
107	10%	1	1	0	0.5	0			A	1	
108	75%	4	4	0	8	2			A	1	
109	10%	1	2	0	1	2			A	1	
110	10%	2	1	0	1	3			A	1	
111	10%	2	3	4	7	4			A	1	

	X	Y	Z	AA	AB	AC	AD	AE	AF	AG	AH
103	1	FALSE			✓						91
104											**91.2**
105			3				✓				92
106		2				✓					93
107	1	FALSE			✓						94
108		2				✓					95
109	1	FALSE			✓						96
110	1	FALSE			✓						97
111		2				✓					98

	A
112	391
113	353
114	354
115	119

	B	C	D	E	F	G	H
112	40.02	Site Utilities, Utility Relocation	ROW	UTI	B	Design	Kam Highway
113	40.02	Site Utilities, Utility Relocation	DCR	UTI	E	Construction	Kam Highway
114	40.02	Site Utilities, Utility Relocation	DCR	UTI	E	Construction	Kam Highway
115	40.02	Site Utilities, Utility Relocation	DCR	UTI	A	Requirements	Kam Highway

	I	J
112	Additional Utility easements may be required for Military/ private utility companies.	New Risk in Sept. 2010 Update. Split into segments from original Risk #111 to include # 390, 391, and #456. Kamehameha Contract - Army has 5' wide easements for all their signal corps utilities.) If we are going to relocate their cables outside of this area, then easements will be required. However it will be on state property.
113	State or Board of Water Supply (BWS) may not grant Waiver to leave in place existing utilities to be abandoned that are not impacted by new structures requiring partial or total removal.	Split into segments. See Risks #351, 353, 355, and 389. City / HDOT requires existing abandoned utilities to be removed and not capped and left in pace - waiver may not be granted. Fuel Lines will be removed and are part of the current estimated scope.
114	Costs for Utility relocations may increase if Utility plans have errors or omissions greater than Contract stipulation on Kamehameha Highway.	Tele Conf June 17th 2010: Contractor will be responsible for design of relocations but risk still remains with City where utilities are not as indicated on the plans (variance greater than 5' from marked position) and / or a utility exists which is not on the plans. Bids have not yet been received. A contingency provision of 35% overall was considered still necessary as there was a lot of ducting in streets and possibility of unforeseen obstructions changing routing. Noting that out of the total $35 million Utility sum in the Engineers estimate $25 million was overhead electrical relocations. Transmission line estimates had been received from HECO but were provisional.
115	Contractor's sag calculations for clearances for fully loaded 138kV lines may determine that HECO requirements are unable to be met and require redesign, alternate technologies or undergrounding.	Crossing the H-1 Freeway along Kamehameha Hwy, between STN 795 and 810+00, creates utility relocation challenges. If the guideway goes over the H-1, there are high voltage overhead lines. If the guideway goes under the H-1, it will need cut and fill and utility relocations. Both scenarios would require more work with utilities than originally estimated.

	K	L
112	See Risk 362 - concurrent and related risk impacts of iwi and Utilities grouped together	The issue of SSI with government agencies will always carry high risk. The risk model must account for this issue and it may become a whole series of unknowns. Early resolution for this will help contain this risk. Agreements with the Military should be drawn up as early as possible. Staff should be signed up with confidentiality agreements during the PE phase.
113	See Risk 362 - concurrent and related risk impacts of iwi and Utilities grouped together	
114	See Risk 362 - concurrent and related risk impacts of iwi and Utilities grouped together	
115	See Risk 362 - concurrent and related risk impacts of iwi and Utilities grouped together	The transmission line height issue should be resolved within PE. This issue should be flushed out and closed out during the PE phase. All power provision issues should be pre-determined to established real costs going into FD. With the MCA's drawn up it will be clear of the costs distribution and so providing more accurate costs with no risk going into FD. There is no reason that this risk cannot be addressed early if HECO are fully onboard.

	M	N	O	P	Q	R	S	T	U	V	W
112	90%	5	1	0	2.5	0			A	1	
113	50%	3	4	0	6	4			A	1	
114	35%	2	3	0	3	3			A	1	
115	50%	3	2	0	3	0			A	1	

	X	Y	Z	AA	AB	AC	AD	AE	AF	AG	AH
112	1	FALSE			✔						99
113		2				✔					100
114	1	FALSE			✔						101
115	1	FALSE			✔						102

	A
116	118
117	368
118	32
119	423
120	**AIRPORT RISKS**
121	66

	B	C	D	E	F	G	H
116	40.02	Site Utilities, Utility Relocation	DCR	UTI	A	Requirements	Kam Highway
117	10.08	Guideway: Retained cut or fill	DCR	CIV	E	Construction	Kam Highway
118	40.08	Temporary Facilities and other indirect costs during construction	DCR	CIV	A	Requirements	Kam Highway
119	50.01	Train control and signals	DCR	SYS	E	Construction	Kam Highway
120							
121	10.04	Guideway: Aerial structure	UNP	GEN	A	Requirements	Airport

	I	J
116	Temporary diversion of the 138kV line may be required if grid capacity is insufficient.	Along Kamehameha Hwy is a major utility corridor with gravity fed sewer and water and electric and fuel lines. This may create a potential need for sleeved utilities through the guideway structure. The cost estimate does (not) include allowance for sleeved utilities.
117	Segment routes may suffer settlement and general damage (including utilities) to surface due to excessive loads and require replacement and or re-surfacing.	New Risk in Sept. 2010 Update. Split into segments - See Risks #367, 368, 369, and 470.
118	Traffic disruption on Kamehameha Highway may result in revised constraints imposed by City or HDOT. (Ex. lane restrictions and peak time flow restrictions)	GEC has had discussions with HDOT who have agreed the preliminary design assumptions with respect to lane closures and traffic management ; Along Kamehameha Hwy through the entire alignment, there may be difficulties dealing HDOT regarding lane shifts and lane reductions. This could require extra traffic mitigation efforts or cause delays in permitting.
119	Late delivery of / or acceptance of civils, structures or guideway contracts may delay systems installations.	New Risk in Sept. 2010 Update. Risk By Segment - #421, 423,453, 454. Kamehameha is still on schedule as of now but it could become critical. Turnover of all stations have a train control communication room and the turnover of the room to the systems contractor.
120		
121	This portion of the alignment crosses over Ceded land which is likely to cause a shift of the alignment. (Not a construction schedule issue - resolved by FD)	Still need to perform a title search, etc

	K	L
116	See Risk 362 - concurrent and related risk impacts of iwi and Utilities grouped together	The transmission line capacity and any issues with the ACD should be resolved within PE. This would include and temporary provisions as part of construction planning and any temporary configurations should be determined upfront. This issue should be flushed out and closed out during the PE phase. All power provision issues should be pre-determined to established real costs going into FD. With the MCA's drawn up it will be clear of the costs distribution and so providing more accurate costs with no risk going into FD. There is no reason that this risk cannot be addressed early if HECO are fully onboard. HECO must also determine whether any upgrades will be required to provide power to all new facilities. The power demand of each facility should be determined during the PE phase to allow HECO to run their calculations and complete their ACD with schematic drawings showing how they will satisfy the AC provision requirements (GEC to assist HECO in doing this). The requirement for the use of multiple E&E's at stations and 3MW TPSS is heavy, and it is quite likely that HECO will need to make changes to their current grid configuration to meet the new additional demand of the transit system.
117	No schedule impact identified	
118	In general ranges - see Risk 340 for full description	
119	Schedule Logic modeling delays of ROW, Utilities and GBR associated risks along with duration uncertainty applied to base durations pushes the schedule interface dates out. An additional risk has been incorporated into the schedule to model lower probability impact of additional delays as a consequence of the preceding cumulative delays. The schedule impact identified in this risk is therefore in the main a consequence of earlier risks. The cost impact will be directly associated with the Core Systems contract the 'schedule delay impact' reflecting this potential and consequence (refer Activity 364)	
120		
121	Modeled in Risk Activity 582 - assumes a 50 / 50 possibility of any of ROW Risks impacting construction with a possible 6 to 15 month potential delay	

	M	N	O	P	Q	R	S	T	U	V	W
116	50%	3	2	0	3	1			A	1	
117	10%	1	2	0	1	0			A	1	
118	75%	4	4	0	8	2			A	1	
119	10%	1	4	0	2	3			A	1	
120											
121	25%	2	3	0	3	4			A	1	

	X	Y	Z	AA	AB	AC	AD	AE	AF	AG	AH
116	1	FALSE									103
117	1	FALSE			✔						104
118		2				✔					105
119	1	FALSE			✔						106
120											**106.2**
121	1	FALSE			✔						107

	A
122	373
123	433
124	466
125	402
126	460
127	417
128	363

	B	C	D	E	F	G	H
122	20.02	Aerial station, stop, shelter, mall, terminal, platform	ROW	ROW	A	Requirements	Airport
123	60.01	Purchase or lease of real estate	ROW	ROW	B	Design	Airport
124	10.04	Guideway: Aerial structure	DCR	GEO	D	Geotech/ Early Construction	Airport
125	40.03	Haz. mat'l, contam'd soil removal/mitigation, ground water treatments	UNP	ENV	D	Geotech/ Early Construction	Airport
126	40.03	Haz. mat'l, contam'd soil removal/mitigation, ground water treatments	UNP	ENV	D	Geotech/ Early Construction	Airport
127	40.04	Environmental mitigation, e.g. wetlands, historic/archeological, parks	DCR	ENV	B	Design	Airport
128	40.04	Environmental mitigation, e.g. wetlands, historic/archeological, parks	UNP	ENV	D	Geotech/ Early Construction	Airport

	I	J
122	Property issues associated with Aloha Stadium Authority could result in scope changes and additional costs.	New Risk in Sept. 2010 Update. Will need to be resolved at ROD.
123	Slight change in alignment could cause changes in required ROW which has not been included in estimate, schedule or EIS. (Depending on changes property needs could increase or decrease.)	New Risk in Sept. 2010 Update.
124	Given limited geotechnical information available at this time, additional costs may be incurred associated with final design through construction.	Nov. PMOC Over the Shoulder - Schedule Delay Reduced from 3 to 0. New Risk in Sept. 2010 Update. Split from #318 into all Segments. See Risks #318,447,466, 467 and 468.
125	Previous gas station at Lagoon Drive Station entrance may have contaminated material and could result in additional costs and schedule delays.	New Risk in Sept. 2010 Update.
126	Discover of unexploded ammunitions disrupts constrution.	New Risk in Sept. 2010 Update.
127	FEMA is in the process of changing their floodplain mapping (to be complete in 2011) which could impact the project and require changes to the design.	New Risk in Sept. 2010 Update. If floodplain is altered - Waipahu Transit Station and Pearl Highlands Station may require adjustment to location. Environmental risks associated with Pearl Highlands Station. Pearl Highlands is built in a flood zone - on stilts - which is a risk. Environmental must guarantee that there is not a rise in water level.
128	During excavation for new Utilities, iwi (Archeological human remains) may be found requiring revised alignment for utility relocations on the Airport segment which are likely to incur additional costs and possible schedule delays from Contractor	Airport segment not believed to carry significant risk of iwi.

	K	L
122	See Risk 66	
123	See Risk 66	
124	Station foundations and column bases given a 2 to 4 month potential delay included in the range on Activity 246. Drilled shafts given a 80% likelihood of a 3 to 6 month potential delay under Risk Activity 263	Risk appears to be connected with requireed depth of deep foundations where a reliable average could be developed.
125	In Risk 466 ranges (Geotechnical GBR issues)	
126	In Risk 466 ranges (Geotechnical GBR issues) and also in 'rare events' modeled in Risk 326 (Risk Activity 494)	This could be an extremely high risk to schedule and affect onsite staff safety during construction. This issue should have been addressed as an integral part of the constructability review process. It has to be picked up someone and the risk managed within that process. The most likely impact will be to schedule. Military services must be fully engaged and prepared while construction is being carried out. An agreement should be sought between the City and the military to address this issue and provide a best practice approach to minimize the impact potential on schedule and life. A statement should be prepared concerning how this situation will be managed and de-risked as much as possible for the project, it is a liability issue.
127	In general ranges - see Risk 340 for full description	
128	Risk Activity 588 captures iwi risks associated with Utility relocations specially at station locations. Modeled at 35% likelihood and with a potential impact of between 1 and 3 months	

	M	N	O	P	Q	R	S	T	U	V	W
122	50%	3	3	1	6	1			A	1	
123	25%	2	5	3	8	3			A	1	
124	75%	4	5	0	10	3			A	1	
125	50%	3	1	0	1.5	0			A	1	
126	5%	1	2	1	1.5	1			A	1	
127	10%	1	2	1	1.5	1			A	1	
128	20%	2	2	2	4	2			A	1	

	X	Y	Z	AA	AB	AC	AD	AE	AF	AG	AH
122		2				✔					108
123		2				✔					109
124			3				✔				110
125	1	FALSE			✔						111
126	1	FALSE			✔						112
127	1	FALSE			✔						113
128		2				✔					114

	A
129	356
130	355
131	386
132	456
133	464
134	44
135	369
136	171

	B	C	D	E	F	G	H
129	40.02	Site Utilities, Utility Relocation	DCR	UTI	E	Construction	Airport
130	40.02	Site Utilities, Utility Relocation	DCR	UTI	E	Construction	Airport
131	40.02	Site Utilities, Utility Relocation	UNP	UTI	D	Geotech/ Early Construction	Airport
132	40.02	Site Utilities, Utility Relocation	ROW	UTI	B	Design	Airport
133	40.02	Site Utilities, Utility Relocation	UNP	UTI	D	Geotech/ Early Construction	Airport
134	10.04	Guideway: Aerial structure	DCR	STR	A	Requirements	Airport
135	10.08	Guideway: Retained cut or fill	DCR	CIV	E	Construction	Airport
136	40.08	Temporary Facilities and other indirect costs during construction	DCR	CIV	E	Construction	Airport

	I	J
129	Costs for Utility relocations may increase if Utility plans have errors or omissions on Airport Segment.	Tele Conf June 17th 2010 : High degree of confidence in existing survey information ; utilities have been checked with manhole cover access and deviations noted and drawings updated with Utility companies. This is currently envisaged as a "Design Bid Build Contract" and there may be a greater risk therefore of Change Orders. A contingency provision of 25% overall was considered still necessary as there was potential risk of changes but noting that out of the total $28 million Utility sum in the Engineers estimate with $22 million for overhead electrical relocations. Transmission line estimates had been received from HECO but were provisional
130	State or Board of Water Supply (BWS) may not grant Waiver to leave in place existing utilities to be abandoned that are not impacted by new structures requiring partial or total removal.	Split into segments. See Risks #351, 353, 355, and 389. City / HDOT requires existing abandoned utilities to be removed and not capped and left in pace - waiver may not be granted. Total cost of Utilities was estimated at $28 Million split $6 million for wet (water, sewer, gas, fuel) and $ 22 Million Electrical and Telecom most of which were above ground relocations.
131	Unforeseen Federal and/or Military cables or fuel lines may result in alignment relocation or costly column span.	New Risk in Sept. 2010 Update. Risk for both Airport and City Center Segment Risk #386 and 469. There may be unmapped T1 lines coming into the Pearl Harbor Naval facility
132	Delay to utility easement agreements may delay access for utility relocations and result in Contractor claims.	Sept. 2010 Update: Split into segments from original Risk #111 to include # 390, 391, and #456.
133	Cost exposure from unexpected utility betterment. (Ex. Underground piping quality may be degraded and require extensive replacement which may not all be offset as betterment)	New Risk in Sept. 2010 Update. Risk Split from #359 into various segments. See Risks #461, 462,463,464 and 465
134	The guideway has a high skew with respect to the roads in the area of the inter island terminal parking access ramp and the Paiea underpass connecting with Aolele which may require special structures.	Sept. 2010 Update: Mitigated in design - risk is more of a constructability issue.
135	Segment routes may suffer settlement and general damage (including utilities) to surface due to excessive loads and require replacement and or re-surfacing.	New Risk in Sept. 2010 Update. Split into segments - See Risks #367, 368, 369, and 470.
136	Traffic disruptions in Airport segment may result in revised constraints imposed by City or HDOT. (Ex. lane restrictions and peak time flow restrictions)	The HDOT may require special alternative routes or other traffic mitigation efforts during construction. This could delay permitting to make traffic plans and may cost more for mitigation efforts.

	K	L
129	Included in and refer to Risk 355	The airport segment will have additional problems associated with utility relocations. Airport vicinities will have additional EMI-EMC requirements and so will generally require a different approach with bonding, galvanic screening and encasing of any existing utilities and new HHCTC signals and systems passing through that area. EMI-EMC study to e completed during PE which will de-risk this issue and provide a basis of known approach for all SS utility works. There may also be airborne signal issues also with RF transmissions and WIFI based data transmission system within the confines of airports. This should be studied also to determine any secondary risks particular to this line segment.
130	Utility risks grouped together for modeling purposes under risk Activity 596 and given a 55% likelihood of between a 4 and 6 month delay with a worst case of up to a 1 year delay. Linked to start of drilled pier foundations. There would in reality not be a delay to all drilled shafts however at this stage there is assumed limited flexibility in being able to by-pass a problem shaft/s impacted by difficult Utility relocations without incurring significant additional costs. Also assumed that as Utilities tend to run in parallel with guideway more than one shaft is likely to be impacted by a difficult relocation and the logic is geared to modeling the impact on follow on activities, in this case the Guideway construction	
131	Included in and refer to Risk 355	
132	Included in and refer to Risk 355	
133	Included in and refer to Risk 355	
134	No schedule impact identified	
135	No schedule impact identified	
136	In general ranges - see Risk 340 for full description	

	M	N	O	P	Q	R	S	T	U	V	W
129	25%	2	3	3	6	3			A	1	
130	50%	3	4	0	6	4			A	1	
131	25%	2	3	4	7	4			A	1	
132	5%	1	1	2	1.5	2			A	1	
133	10%	2	3	4	7	4			A	1	
134	10%	1	1	0	0.5	0			A	1	
135	25%	2	2	0	2	0			A	1	
136	50%	3	3	2	7.5	2			A	1	

	X	Y	Z	AA	AB	AC	AD	AE	AF	AG	AH
129		2				✔					115
130		2				✔					116
131		2				✔					117
132	1	FALSE			✔						118
133		2				✔					119
134	1	FALSE			✔						120
135	1	FALSE			✔						121
136		2				✔					122

	A
137	453
138	**CITY CENTER RISKS**
139	69
140	439
141	434
142	437
143	436
144	467
145	401
146	364

	B	C	D	E	F	G	H
137	50.01	Train control and signals	DCR	SYS	E	Construction	Airport
138							
139	10.04	Guideway: Aerial structure	UNP	GEN	A	Requirements	City Center
140	60.01	Purchase or lease of real estate	LEG	ROW	B	Design	City Center
141	60.01	Purchase or lease of real estate	ROW	ROW	B	Design	City Center
142	60.01	Purchase or lease of real estate	ROW	ROW	B	Design	City Center
143	60.01	Purchase or lease of real estate	ROW	ROW	B	Design	City Center
144	10.04	Guideway: Aerial structure	DCR	GEO	D	Geotech/ Early Construction	City Center
145	40.03	Haz. mat'l, contam'd soil removal/mitigation, ground water treatments	UNP	ENV	D	Geotech/ Early Construction	City Center
146	40.04	Environmental mitigation, e.g. wetlands, historic/archeological, parks	UNP	ENV	D	Geotech/ Early Construction	City Center

	I	J
137	Late delivery of / or acceptance of civils, structures or guideway contracts may delay systems installations.	New Risk in Sept. 2010 Update. Risk By Segment - #421, 423,453, 454 Low probability at this time. Turnover of all stations have a train control communication room and the turnover of the room to the systems contractor.
138		
139	Alignment passes near a Federal Building which may raise homeland security concerns.	Sept. 2010: Agreement not yet in place. June 17th 2010 - Discussions to confirm if this is seen as an issue
140	Kapalama Entrance may be a concern due to proximity to adjacent ROW.	New Risk in Sept. 2010 Update.
141	Slight change in alignment could cause changes in required ROW which has not been included in estimate, schedule or EIS. (Depending on changes property needs could increase or decrease)	New Risk in Sept. 2010 Update.
142	Ala Moana Center Station has ROW issues that have yet to be discussed with owner and may result in additional costs and delays.	New Risk in Sept. 2010 Update.
143	Kaka'ako Station currently requires partial demolition which has yet to be discussed with owner and may result in additional costs and delays.	New Risk in Sept. 2010 Update.
144	Given limited geotechnical information available at this time, additional costs may be incurred associated with final design through construction.	New Risk in Sept. 2010 Update. Split from #318 into all Segments. See Risks #318,447,466, 467 and 468.
145	Nimitz Highway (1 mile) known to be contaminated from old fuel line leaks - Utility excavations may lead to significant volumes of excavated soil.	New Risk in Sept. 2010 Update. City Center and Possibly Airport
146	During excavation for new Utilities iwi(Archeological human remains) may be found requiring revised alignment for utility relocations on the City Center segment which are likely to incur additional costs and possible schedule delays from Contractor	Burial plan is in the works to determine if reinternment is acceptable or if burial in place is required. City Center segment carries significant risk of iwi and as narrow street and large utilities will exist this could be a significant cost and schedule risk - additional time for Utility relocations is recommended with as much pot holing and pre-trenching done as possible for the most significant and most difficult utilities to re-align.

	K	L
137	Schedule Logic modeling delays of ROW, Utilities and GBR associated risks along with duration uncertainty applied to base durations pushes the schedule interface dates out. An additional risk has been incorporated into the schedule to model lower probability impact of additional delays as a consequence of the preceding cumulative delays. The schedule impact identified in this risk is therefore in the main a consequence of earlier risks. The cost impact will be directly associated with the Core Systems contract the 'schedule delay impact' reflecting this potential and consequence (refer Risk Activity 536)	Again this risk is replicated from risks 421 & 423. This risk could be generically applied and managed as a single risk within the register. There may be a case for splitting this out on a contract basis if risks are to be transferred to contractors responsible for each line segment. In that way the risk is managed 'locally' with ownership by that contractor. This can be seen as a risk to the civil works contractor which is segment based, but impacts the CSC on a system level basis. Delays on one segment may affect CSC works/schedule on adjacent segments. The CSC risk should be higher level generic (system wide).
138		
139	ROW grouped together under Risk Activity 600 (Risks 69, 434, 439, 437, 436, PTY City Center) Linked to completion of Utilities with a 1 to 3 month potential delay at a 55% likelihood	Recommendation that DHS and GSA be involved and sign off on any agreement. If law enforcement or other security sensitive agencies are located in the building, they should be included in discussions.
140	See Risk 69 - ROW risks grouped together	
141	See Risk 69 - ROW risks grouped together	
142	See Risk 69 - ROW risks grouped together	
143	See Risk 69 - ROW risks grouped together	
144	Two parallel risks added. One related specially to station foundations and the other to drilled guideway shafts. Both given a 90% likelihood of between a 1 to 3 month delay to station or guideway foundation construction with a worst case of 6 months delay (note also 'rare events' Risk 326 - Risk Activity 845)	
145	Incorporated into Risk 364 and 467 (iwi, utility and geotechnical Risks)	
146	Two parallel risks added. One related specially to station foundations and the other to drilled guideway shafts. Both given a 60% likelihood of between a 1 to 4 month delay to follow on station or guideway foundation construction (note also 'rare events' Risk 326 Risk Activity 845)	

	M	N	O	P	Q	R	S	T	U	V	W
137	10%	1	4	3	3.5	3			A	1	
138											
139	10%	1	2	1	1.5	1			A	1	
140	50%	3	1	2	4.5	2			A	1	
141	50%	3	5	2	10.5	2			A	1	
142	90%	5	3	0	7.5	0			A	1	
143	25%	2	3	0	3	0			A	1	
144	90%	5	5	3	20	3			A	1	
145	90%	5	3	0	7.5	0			A	1	
146	75%	4	3	2	10	2			A	1	

	X	Y	Z	AA	AB	AC	AD	AE	AF	AG	AH
137			2			✔					123
138											**123.2**
139	1	FALSE			✔						124
140			2			✔					125
141			3				✔				126
142			2			✔					127
143	1	FALSE			✔						128
144			3				✔				129
145			2			✔					130
146			3				✔				131

	A
147	415
148	410
149	414
150	388
151	117
152	469
153	358
154	389

	B	C	D	E	F	G	H
147	40.04	Environmental mitigation, e.g. wetlands, historic/archeological, parks	POL	ENV	A	Requirements	City Center
148	40.04	Environmental mitigation, e.g. wetlands, historic/archeological, parks	UNP	ENV	D	Geotech/ Early Construction	City Center
149	40.04	Environmental mitigation, e.g. wetlands, historic/archeological, parks	POL	ENV	A	Requirements	City Center
150	40.02	Site Utilities, Utility Relocation	UNP	UTI	A	Requirements	City Center
151	40.02	Site Utilities, Utility Relocation	DCR	UTI	B	Design	City Center
152	40.02	Site Utilities, Utility Relocation	UNP	UTI	D	Geotech/ Early Construction	City Center
153	40.02	Site Utilities, Utility Relocation	DCR	UTI	E	Construction	City Center
154	40.02	Site Utilities, Utility Relocation	UNP	UTI	E	Construction	City Center

	I	J
147	Given that Downtown Station is in a historic district, community needs may cause additional costs and possible delays.	New Risk in Sept. 2010 Update.
148	If numerous iwi are found, it could be eligible for inclusion of the national registry which would require realignment of guideway.	New Risk in Sept. 2010 Update. Low Probability, High Cost, High Schedule Delay
149	Given that Chinatown Station is in a historic district, community needs may cause additional costs and possible delays.	New Risk in Sept. 2010 Update.
150	Halekauwila Street has very limited space and if additional relocation is identified from what is currently planned, either rerouting or additional ROW may be required.	New Risk in Sept. 2010 Update. Change encountered after start of construction.
151	Fuel line at proposed alignment on Nimitz Highway may require alternative design solution.	Sept. 2010 Update: City center fuel line (6") may not be relocatable within Nimitz highway requiring more ROW or alternative solutions
152	Unforeseen Federal and/or Military cables or fuel lines may result in alignment relocation or costly column span.	New Risk in Sept. 2010 Update. Risk for both Airport and City Center Segment Risk #386 and 469.
153	Costs for Utility relocations may increase if Utility plans have errors or omissions on City Center segment.	Tele Conf June 17th 2010: High degree of confidence in existing survey information. Utilities have been checked with manhole cover access and deviations noted and drawings updated with Utility companies. This is currently envisaged as a "Design Bid Build Contract" and there may be a greater risk therefore of Change Orders . A contingency provision of 35% overall was considered still necessary as there was potential risk of changes but noting that out of the total $111 million Utility sum in the Engineers estimate $97 million was overhead electrical relocations. Transmission line estimates had been received from HECO but were provisional.
154	State or Board of Water Supply (BWS) may not grant Waiver to leave in place existing utilities to be abandoned that are not impacted by new structures requiring partial or total removal.	New Risk in Sept. 2010 Update.Split into segments. See risks #351, 353, 355, and 389. City / HDOT requires existing abandoned utilities to be removed and not capped and left in pace - waiver may not be granted.

	K	L
147	No schedule impact identified	
148	Incorporated into Risk 326 (Risk Activity 845) rare events	
149	Refer to (grouped with) Risk 467 Geotechnical issues and ROW issues Risk 69	
150	Incorporated into Risk 364 and 467 (iwi, utility and geotechnical risks)	
151	Incorporated into Risk 364 and 467 (iwi, utility and geotechnical risks)	
152	Incorporated into Risk 364 and 467 (iwi, utility and geotechnical risks)	This risk is the same as Risk 386 and could be subject to SSI problems.
153	Incorporated into Risk 364 and 467 (iwi, utility and geotechnical risks)	
154	Incorporated into Risk 364 and 467 (iwi, utility and geotechnical risks)	

	M	N	O	P	Q	R	S	T	U	V	W
147	25%	2	2	0	2	0			A	1	
148	5%	1	5	5	5	5			A	1	
149	25%	2	2	0	2	0			A	1	
150	25%	2	3	4	7	4			A	1	
151	25%	2	1	2	3	2			A	1	
152	25%	2	3	4	7	4			A	1	
153	35%	2	3	3	6	3			A	1	
154	50%	3	4	3	10.5	3			A	1	

	X	Y	Z	AA	AB	AC	AD	AE	AF	AG	AH
147	1	FALSE			✔						132
148		2				✔					133
149	1	FALSE			✔						134
150		2				✔					135
151	1	FALSE			✔						136
152		2				✔					137
153		2				✔					138
154			3				✔				139

	A
155	390
156	398
157	442
158	465

	B	C	D	E	F	G	H
155	40.02	Site Utilities, Utility Relocation	ROW	UTI	E	Construction	City Center
156	40.02	Site Utilities, Utility Relocation	DCR	UTI	B	Design	City Center
157	40.02	Site Utilities, Utility Relocation	UNP	UTI	A	Requirements	City Center
158	40.02	Site Utilities, Utility Relocation	UNP	UTI	D	Geotech/ Early Construction	City Center

	I	J
155	Delay to utility easement agreements for City Center may delay access for utility relocations and result in Contractor claims.	New Risk in Sept. 2010 Update. September 2010 Update: Split into segments from original Risk #111 to include # 390, 391, and #456. HECO utilities may require easements if transformers cannot be submerged. Needs will not be determined until final design. Updated June 2010 - Acquisitions/relocations are being scheduled in accordance with Construction Contract Schedules. Many refer to access not being available to meet the schedule. ROW can not be progressed before ROD
156	Assumption is water mains will be relocated around columns by addition of bends - this may not be allowed by BWS.	New Risk in Sept. 2010 Update. Segment G - board may object to amount of bends around watermains. Result in costly manholes and/or more significant relocation
157	If the incorporation of relocation of the existing 138KV line on guideway is found to interfere with train controls, relocation to other streets would be required. (Or to keep as currently designed and costed - offset from current overhead location by 10'.)	New Risk in Sept. 2010 Update. Current design is to keep overhead section and offset 10' from current alignment and it has been verified as possible option from HECO. Decision if it can be installed on guideway will be made by end of December 2010. Need to have the Core Systems Contractor to review as well if the study finds that interference could be possible. The cost could be nothing if the contractor accepts this possibility and if they do not accept it then the cost could be considered a betterment in full or partially by HECO. Would not allow for the line to be installed on guideway if there is any chance for interference. The city wants it to be hidden to beautify and it also could cause issues with utility maintenance.
158	Cost exposure from unexpected utility betterment. (Ex. Underground piping quality may be degraded and require extensive replacement which may not all be offset as betterment)	New Risk in Sept. 2010 Update. Risk Split from #359 into various segments. See Risks #461, 462,464 and 465

	K	L
155	Incorporated into Risk 364 and 467 (iwi, utility and geotechnical risks)	
156	Incorporated into Risk 364 and 467 (iwi, utility and geotechnical risks)	
157	Incorporated into Risk 364 and 467 (iwi, utility and geotechnical risks). Note this risk could potentially cause a 12 month delay however it is assumed that this would be developed through detailed design and either planned around or designed out at least making such a catastrophic delay fall under 'rare or unforeseen events' covered in Risk 326	This issue is not likely unless an RF based system is being proposed. GPS technology would have major problems operating effectively in these conditions. The use of fiber optic cables and screening will mitigate against these influences/effects. There will be proximity issues and these will also include those requirements for isolation safety and flash over protection.
158	Incorporated into Risk 364 and 467 (iwi, utility and geotechnical risks)	

	M	N	O	P	Q	R	S	T	U	V	W
155	50%	3	1	1	3	1			A	1	
156	5%	1	3	3	3	3			A	1	
157	5%	1	5	5	5	5			A	1	
158	10%	2	3	4	7	4			A	1	

	X	Y	Z	AA	AB	AC	AD	AE	AF	AG	AH
155	1	FALSE			✓						140
156	1	FALSE			✓						141
157		2				✓					142
158		2				✓					143

	A
159	123
160	48
161	470
162	178
163	438
164	191

	B	C	D	E	F	G	H
159	40.02	Site Utilities, Utility Relocation	DCR	UTI	A	Requirements	City Center
160	10.04	Guideway: Aerial structure	DCR	STR	B	Design	City Center
161	10.08	Guideway: Retained cut or fill	DCR	CIV	E	Construction	City Center
162	40.08	Temporary Facilities and other indirect costs during construction	DCR	CIV	E	Construction	City Center
163	20.02	Aerial station, stop, shelter, mall, terminal, platform	LEG	CIV	B	Design	City Center
164	40.08	Temporary Facilities and other indirect costs during construction	DCR	CIV	E	Construction	City Center

	I	J
159	The relocation of the 138 kv overhead power lines may require new lines erected to provide redundancy during the 'outage'. (Temporary diversion of the 138kV line may be required if grid capacity is insufficient.)	September 2010 Update: Sept. 2010 Update: Temp. Relocation or Protection is required. Looking to relocate 138kV line into guideway and are doing a study to see if there is a possibility of interference. Updated June 17th 2010 - 138kV - Elevated HECO lines on both sides of street. ; these costs could be significant and are not included in the current estimate ; an ROM of $10 million was suggested for unforeseen work in connection with the 138 KV line relocations but this could be more or less ; no detailed estimates or approach had as yet been discussed with HECO.
160	Staging, schedule and cost may be greater than assumed for the Keehi interchange.	Sept. 2010 Update: Will be resolved by FD. Crossing over the Keehi Interchange creates potentially long spans as the guideway passes over Keehi interchange and the contraflow lanes must be considered during the structural planning.
161	Segment routes may suffer settlement and general damage (including utilities) to surface due to excessive loads and require replacement and or re-surfacing.	New Risk in Sept. 2010 Update. Split into segments - See Risks #367, 368, 369, and 470.
162	Access to Honolulu Community College may be restricted by construction and noise levels may need to be mitigated while school is in session.	Sept. 2010 Update. Not a Risk. DBB - no schedule issues since it will be resolved by FD This is a local issue - maintaining access is assumed to be possible but constraints on the Contractor need to be investigated to address the potential costs involved and any impact to the schedule
163	Redesign of station access for Downtown Station may be required due to objections.	New Risk in Sept. 2010 Update.
164	Traffic disruptions in City Center segment may result in revised constraints imposed by City or HDOT. (Ex. lane restrictions and peak time flow restrictions) .	From Nuuanu stream to Ala Moana Blvd is a heavily trafficked area and flow maintenance will be challenging during construction. This is a local issue - maintaining access is assumed to be possible but constraints on the Contractor need to be investigated to address the potential costs involved and any impact to the schedule

	K	L
159	Incorporated into Risk 364 and 467 (iwi, utility and geotechnical risks)	This risk relates to Risk 118. A comprehensive power backup and redundancy policy/plan should be established during PE and the elements required included in the TP of the CSC. This should include all UPS requirements at facilities down to local wayside cabinets. Without this policy there will be no way of designing a base TP system that will satisfy any emergency operational requirements. It is a known that HI has inconsistencies in power continuity there these backup provisions are essential in mitigating against risks of patrons on vehicles being trapped between stations during outages. The transmission line capacity and any issues with the ACD should be resolved within PE, which should include any fall back arrangements such as dual feeds from substations and alternate feeds from adjacent substations etc. This would include and temporary provisions as part of construction planning and any temporary configurations should be determined upfront. This issue should be flushed out and closed out during the PE phase. All power provision issues should be pre-determined to established real costs going into FD. With the MCA's drawn up it will be clear of the costs distribution and so providing more accurate
160	No schedule impact identified	
161	No schedule impact identified	
162	No schedule impact identified	
163	Risk Activity 606 specifically added with impact to Downtown station only. Potential 3 to 6 months delay at an 80% likelihood	
164	In general ranges - see Risk 340 for full description	

	M	N	O	P	Q	R	S	T	U	V	W
159	50%	3	2	1	4.5	1			A	1	
160	25%	2	3	0	3	0			A	1	
161	90%	5	4	0	10	0			A	1	
162	50%	3	2	0	3	0			A	1	
163	75%	4	3	0	6	3			A	1	
164	75%	4	4	2	12	2			A	1	

	X	Y	Z	AA	AB	AC	AD	AE	AF	AG	AH
159		2				✔					144
160	1	FALSE			✔						145
161			3				✔				146
162	1	FALSE			✔						147
163		2				✔					148
164			3				✔				149

	A
165	194
166	454
167	
168	312
169	360
170	422

	B	C	D	E	F	G	H
165	40.08	Temporary Facilities and other indirect costs during construction	DCR	CIV	A	Requirements	City Center
166	50.01	Train control and signals	DCR	SYS	E	Construction	City Center
167	**CORE SYSTEMS PROJECT WIDE**						
168	90.00	Unallocated - all SCC's	DCR	GEN	B	Design	Core Systems Project Wide
169	40.02	Site Utilities, Utility Relocation	UNP	UTI	B	Design	Core Systems Project Wide
170	50.01	Train control and signals	DCR	SYS	E	Construction	Core Systems Project Wide

	I	J
165	This area contains a major bus interface and access to the parking structure of Ala Moana Center. Traffic impacts must be mitigated and bus operations must be continued.	May have to put up temporary structures to protect buses from falling mat. This is a local issue - maintaining access is assumed to be possible but constraints on the Contractor need to be investigated to address the potential costs involved and any impact to the schedule
166	Late delivery of / or acceptance of civils, structures or guideway contracts may delay systems installations.	New Risk in Sept. 2010 Update. Risk By Segment - #421, 423,453, 454. Low probability at this time. Turnover of all stations have a train control communication room and the turnover of the room to the systems contractor.
167		
168	City may require design changes to DB submittals resulting in formal change orders.	Sept. 2010 Update: Risks broken down by DB Contract Segments. See Risks #312, 449, 450, and 451. This affects each segment of Core Systems slighlty differently. The issue with Core Systems design would also include late changes due to lessons learned from previously open segments.
169	Utility costs and scope to provide power to TPSS (traction power sub stations) may be more than estimated. (ex. HECO may need to construct an additional substation to supply power to TPSS which would 2 years.) To further Discuss w Core Systems.	New risk June 17th 2010 - On other projects power supplies to TPSS's have been the subject of change and significant additional costs. The location of TPSS typically change and ROW issues, working around street and final station and landscaping can significantly impact the length and costs of power supply feeds. Cost risk associated with this risk should be part of the Unallocated contingency provision unless specific risk can be identified within a contract segment.
170	Period for design reviews by City and its Consultants and acceptance of DBOM submittals could be too short and delay contractor.	New Risk in Sept. 2010 Update. Current specs sometimes reflect DBB and are very detailed. The DB should have performance specs to work to. If DB contractor changes design it could cause conflicts on decision making with specs. This will be a learning curve but needs to be recognized and fixed quickly.

	K	L
165	No schedule impact identified	
166	Schedule Logic modeling delays of ROW, Utilities and GBR associated risks along with duration uncertainty applied to base durations pushes the schedule interface dates out. An additional risk has been incorporated into the schedule to model lower probability impact of additional delays as a consequence of the preceding cumulative delays. The schedule impact identified in this risk is therefore in the main a consequence of earlier risks. The cost impact will be directly associated with the Core Systems contract the 'schedule delay impact' reflecting this potential and consequence (refer Risk Activity 782)	Again this risk is replicated from risks 421, 423 & 453. This risk could be generically applied and managed as a single risk within the register. There may be a case for splitting this out on a contract basis if risks are to be transferred to contractors responsible for each line segment. In that way the risk is managed 'locally' with ownership by that contractor. This can be seen as a risk to the civil works contractor which is segment based, but impacts the CSC on a system level basis. Delays on one segment may affect CSC works/schedule on adjacent segments. The CSC risk should be higher level generic (system wide).
167		
168	Risk Activity 433 added and modeled at 90% likelihood of a 2 to 6 month extended design period for Core Systems - not critical to project completion but likely will have indirect cost implications	
169	No schedule impact identified	This risk relates to Risks 118 and 123.
170	Incorporated into Risk 420	If this is a true risk, the underlying design review process requires revising and firm turnaround dates and periods specified that can be used as a schedule to mitigate against these delays. Delays incurred through this predetermined process basically mean that the process is flawed and does not function effectively requiring redress. A right first time approach here would de-risk this potential for schedule delays. Automated and distributed management systems will assist in managing this risk, which the GEC has already developed. This issue should be viewed as carrying a low risk.

	M	N	O	P	Q	R	S	T	U	V	W
165	90%	5	3	0	7.5	0			A	1	
166	10%	1	4	3	3.5	3			A	1	
167											
168	90%	5	4	3	17.5	3			A	1	
169	25%	2	4	0	4	0			A	1	
170	25%	2	2	2	4	2			A	1	

	X	Y	Z	AA	AB	AC	AD	AE	AF	AG	AH
165		2				✔					150
166		2				✔					151
167											
168			3				✔				152
169		2				✔					153
170		2				✔					154

	A
171	424
172	420
173	457
174	425

	B	C	D	E	F	G	H
171	50.01	Train control and signals	DCR	SYS	A	Requirements	Core Systems Project Wide
172	50.01	Train control and signals	LEG	SYS	C	Market	Core Systems Project Wide
173	50.03	Traction power supply: substations	CFR	SYS	A	Requirements	Core Systems Project Wide
174	50.03	Traction power supply: substations	CFR	SYS	A	Requirements	Core Systems Project Wide

	I	J
171	Platform screen doors are currently not in estimate and if a decision is made to add them it will be at a cost and also require additional interfaces with driverless automated doors.	New Risk in Sept. 2010 Update. Have yet to determine if doors will be used. The cost impact to using screen doors would be $10 to 15 Million. If it breaks the budget it will not be used.
172	May be a legal protest to award of core systems and Delay NTP.	New Risk in Sept. 2010 Update. Good possibility.
173	Emergency power supply options in Systems bid is not yet determined and if it is determined to be needed it would increase costs since it is not in the base estimate.	New Risk in Sept. 2010 Update. Energy recovery systems at TPSS is estimated around $22 million to $86 million for one bidder. However large generators to support system in event of total island power outage may be required. On board vehicle battery power is still 'experimental' whereas Generators are proven technology. Using emergency generators would eliminate TPSS ROW issues. PB is in the process of doing a study. This may be able to be put in BAFO.
174	Emergency storage is currently an optional requirement and if it is required it could increase costs significantly due to increased ROW needs or possible storage at TPSS. (if it is not currently included in estimate it could increase costs.)	New Risk in Sept. 2010 Update. Have 18 sites identified and are using only 13 or 15 sites so there is some leeway. Using emergency generators (not in EIS) would eliminate TPSS ROW issues. PB is in the process of doing a study.

	K	L
171	No schedule impact identified	A decision should be made as early as possible and the associated costs included in the estimate. If the decision is not to use PSD's then this is not a risk. If the decision remains to use PSD's in the future and specific designs carry some level of provision for PSD's the design itself will carry a risk. It should be identified that retro fitting PSD's under CO's will be more costly and should be avoided if possible. This will also introduce more risks associated with compatibility issues with existing already operating subsystems under an existing O&M contract that does not include PSD's. This decision must be made very carefully considering all aspects of the system operation and safety at the outset. The safety related benefits may be seen to out way the implementation costs in long term operations and assist in reducing the count for projected patron fatalities at stations.
172	Linked with Risk 422 and 312. Bid reviews and protests. 55% likelihood of a 1 to 6 month delay - not critical to project completion but likely will have indirect cost implications	
173	No schedule impact identified	This risk relates to Risks 118, 123 and 360.
174	No schedule impact identified	This risk may no longer exist as this requirement may have been fully removed for BAFO under addendum 41. The vehicle onboard energy storage option was dropped. The impact to the intended operations plan should be reviewed for this change. The original requirement for this provision may have been over specified increasing costs significantly. The removal of this should reduce costs for BAFO. Other means of providing similar fallback arrangements should be investigated. Decisions concerning the use of this type of technology and provision in the CSC should be made before entering FD. This risk is associated with onsite diesel storage tanks for backup generators. It may be more effective to use natural gas turbines, which are faster cheaper and do not require any environmental clearances for use at TPSS. A portable truck based unit could also be used that is deployed where necessary, not being fixed or having any subsurface requirements.

	M	N	O	P	Q	R	S	T	U	V	W
171	50%	3	5	0	7.5	0			A	1	
172	50%	3	5	0	7.5	3			A	1	
173	50%	3	5	0	7.5	0			A	1	
174	10%	1	5	0	2.5	0			A	1	

	X	Y	Z	AA	AB	AC	AD	AE	AF	AG	AH
171		2				✔					155
172		2				✔					156
173		2				✔					157
174	1	FALSE			✔						158

	A
175	426
176	427
177	441
178	430

	B	C	D	E	F	G	H
175	50.06	Fare collection system and equipment	DCR	SYS	B	Design	Core Systems Project Wide
176	50.06	Fare collection system and equipment	CFR	SYS	A	Requirements	Core Systems Project Wide
177	50.06	Fare collection system and equipment	CFR	SYS	A	Requirements	Core Systems Project Wide
178	50.07	Central Control	DCR	SYS	B	Design	Core Systems Project Wide

	I	J
175	Final Fare collection system may have cost impacts to controls and signaling.	New Risk in Sept. 2010 Update. Some additional costs would be required since fare gates would be an additional interface.
176	Final Fare collection system may add additional fare collection machines, more automation and 'smart' fare collection and tracking.	New Risk in Sept. 2010 Update. Gates, etc would have to go into every station. Total for all about $10 to 15 million
177	Fare gates are currently not in estimate and if decision is to use them it will increase costs. (About $1 Million a station)	New Risk in Sept. 2010 Update. The issue is if they can afford it without breaking the budget. Until it is known a decision cannot be made. $20 million additional cost.
178	Back-up system proposed integrated with City Traffic Management Center may be underestimated.	New Risk in Sept. 2010 Update. Contractor has this in his contract. It is a brand new facility being built. Our needs are being incorporated into the design.

	K	L
175	No schedule impact identified	\Fare collection policies must be established prior to defining what equipment must be provided to satisfy this policy. This risk can be deleted once a policy has been adopted and the design direction fixed in terms of media point of sales and transaction types etc. the outcome of the study will impact CSC TP5.
176	No schedule impact identified	This risk really relates only to the fact that the CSC as it stands calls for minimal AFC provision at project outset, leading to future central server based operations at a later date pending future changes in policy. This isn't really a risk as it is kno0wn now that this approach will incur additional costs later on and the final cost being much more expensive as certain pieces of equipment will need upgrading etc. A decision should be made to include this functionality to support the final intended subsystem or not, after which this risk can be removed.. there could be an interim solution of using platform ticket validators for example, that may improve the ability to transition/evolve the AFC system in the future.
177	No schedule impact identified	Post decision on policy, the use of gate line barriers at stations will be determined at which this is no longer a risk. The use of GLB's will assist in controlling any homeless persons issues at stations. It is costly to install and maintain, however provides better assurance of revenues and avoids the requirement for onboard ticket inspectors.
178	No schedule impact identified	Although the needs are incorporated into the design, this is a major third-party interface and could have significant schedule impact as City Traffic Management department may have their unique integration issues to be resolved. This risk can be minimized by defining the requirements as detailed as possible prior to entering FD. This risk will be dependent upon the schedule of the new building and how this relates to the HHCTC schedule. If the existing JMTC contract allows for the fallback OCC provision, this should not be viewed as a high risk. Focus must be placed on integration related components such as ductbanks, isolated communications networking and other logistically issues such as reserved car parking for HHCTC staff to ensure the final product works in practice.

	M	N	O	P	Q	R	S	T	U	V	W
175	50%	3	3	0	4.5	0			A	1	
176	50%	3	5	0	7.5	0			A	1	
177	50%	3	5	0	7.5	0			A	1	
178	10%	1	2	0	1	0			A	1	

	X	Y	Z	AA	AB	AC	AD	AE	AF	AG	AH
175		2				✔					159
176		2				✔					160
177		2				✔					161
178	1	FALSE			✔						162

	A
179	428
180	**PREVIOUSLY RAISED RISKS NO LONGER DEEMED TO BE A RISK OR ARE DUPLICATES**
181	4
182	9

	B	C	D	E	F	G	H
179	70.02	Heavy Rail	CFR	SYS	B	Design	Core Systems Project Wide
180							
181	40.08	Temporary Facilities and other indirect costs during construction	UNP	CIV	A		Project wide
182	10.04	Guideway: Aerial structure	DCR	CIV	B		City Center

	I	J
179	Manual operated safety step extensions from vehicles in event of an evacuation may be required to satisfy safety offices evacuation concerns.	New Risk in Sept. 2010 Update.
180		
181	The interface and coordination with the Hawaii Department of Transportation (HDOT) will be onerous and a MOU has yet to be executed. Also, the City must address all FHWA requirements.	Duplicate: See Risks #170, 32, 171, 191 MOU is in the works. Detailed coordination will be worked out in the future. The intention is contractors take ownership of the streets / highways they are working in and pay for maintenance, cleaning and repairs during their possession. The exact requirements as to minimum access during peak commuting travel hours has not be definitively defined for each segment and onerous requirements arising out of traffic disruption and / or increased incidence of accidents arising as a result of changes in weaves, junction patterns, right hand turns and complex staging may result in more Police costs, restrictive working hours and in turn additional project costs.
182	Construction of guideway in City Center areas with tight curves may be more challenging than anticipated.	Sept. 2010 - Check with Jim Baig if additional cost in estimate. With regard to gantry approach for curves, the construction methods will ultimately be determined by contractors; however, estimators need to work with constructability professionals to account for techniques available and factor likely costs. Getting around tight curves could be a problem and require attention to schedule detail - only a risk if not accounted for in the schedule.

	K	L
179	No schedule impact identified	Currently, there are no requirements for safety step extensions in vehicle specifications. Adding them after vehicle contract NTP could have a major impact on vehicle carbody design resulting in cost & schedule impact. Auto deployed steps for detraining out of stations will increase the cost of vehicles. This should be costed in by the LRV supplier and so not carry high risk to costs. The use of proven technology where possible will help to mitigate against functional failure. This requirement should be determined prior to entering FD, and this risk as defined can be removed.
180		
181		
182		If the tight curves are more severe than vehicle specification requirements, then it could have an impact on vehicle design resulting in cost and schedule impact.

	M	N	O	P	Q	R	S	T	U	V	W
179	70%	3	5	0	7.5	0			A	1	
180											
181					0				X	0	
182					0				X	0	

	X	Y	Z	AA	AB	AC	AD	AE	AF	AG	AH
179		2				✔					163
180											
181											
182											

	A
183	18
184	42
185	45
186	46
187	47
188	70

	B	C	D	E	F	G	H
183	10.04	Guideway: Aerial structure	DCR	CIV			City Center
184	10.04	Guideway: Aerial structure	DCR	GEN			Airport
185	10.04	Guideway: Aerial structure	DCR	GEN			Airport
186	10.04	Guideway: Aerial structure	DCR	GEO			Airport
187	10.04	Guideway: Aerial structure	DCR	STR			Airport
188	10.04	Guideway: Aerial structure	DCR	STR	A		City Center

	I	J
183	Contractors may not be able to obtain lay down and staging areas.	Sept. 2010 Update: Duplicate This could be a significant issue for Pile Drilling in medians where slurry / bentonite and large steel casings along with heavy long reinforcement cages are required. Lay down areas have not been identified. The City should identify locations where it currently owns the land, leaving final decisions with the contractor. Availability of public lands should be included in the contract documents.
184	An expansion is planned for the airport terminal which may cause a shift in guideway location, or may require special design to accommodate.	Sept. 2010 Update: Accommodated in Design. No longer a Risk This issue is currently the subject of discussion and is awaiting a formal approval from FTA / FAA / Governor approvals
185	The guideway elevation will need to be coordinated with airport with respect to the clear space requirements for the airfield and runway.	September 2010 Update : Risk gone away - in EIS
186	Soft soil is expected through Keehi Lagoon Beach park, Halawa Stream and over the Moanalua stream outlet into the lagoon and is determined to be worse than expected. (Each foot is an additional 10k - 10 columns)	Sept. 2010 Update: Duplicate. See Risks #466.
187	Crossing over Moanalua stream has challenges of soft soils and existing freeway ramps which may require long spans or special structures.	Covered in design and any additional risk for the area is covered in Risk #466.
188	The scope of tail tracks, station configuration and guideway height at the Ala Moana Station is still under discussion and may have significant cost and schedule implications.	Sept. 2010 Update: Not a Risk. Future changes would result in cost savings. PE drawings and estimate include for the future extension - if changes occur it would be a cost saving since scope would be removed. This location for the end of the First Project line will require special configuration of the storage tracks (potentially 5 in the area 2 top and 3 bottom tracks), existing structural ramps must be considered, and plans must be coordinated for the future extension of the line.

	K	L
183		
184		
185		
186		
187		
188		Has the possibility of a future EB track beginning at Station 1484+50 been addressed in the RFP drawings?

	M	N	O	P	Q	R	S	T	U	V	W
183					0				X	0	
184					0				X	0	
185					0				X	0	
186					0				X	0	
187					0				X	0	
188					0				X	0	

	X	Y	Z	AA	AB	AC	AD	AE	AF	AG	AH
183											
184											
185											
186											
187											
188											

	A
189	73
190	89
191	90
192	91
193	94

	B	C	D	E	F	G	H
189	10.09	Track: Direct fixation	DCR	GEN	A		Project wide
190	20.02	Aerial station, stop, shelter, mall, terminal, platform	DCR	GEN	B		Kam Highway
191	20.02	Aerial station, stop, shelter, mall, terminal, platform	DCR	STR	B		Project wide
192	20.02	Aerial station, stop, shelter, mall, terminal, platform	DCR	GEN			Airport
193	20.02	Aerial station, stop, shelter, mall, terminal, platform	DCR	GEO			City Center

	I	J
189	The design of the vehicle may impact guideway and column / foundation designs assumed in the DB contracts and result in additional costs to the City.	Sept. 2010 Update: Not a Risk Discussed during week of June 17th 2010 - particularly may impact Segment 12 and 3 current awarded / out to bid depending on what Core Systems contractor is chosen. With regard to the vehicle and consist maximum weight and dynamic load considerations, the car is assumed to be Light Metro, though some specifics and its capacity (and train length) are yet to be defined. DB contracts currently based on draft loadings, vehicle sizes.
190	The Pearlridge station location, at the intersection of Kamehameha Hwy and Kaonohi St. may shift to avoid the intersection.	Sept. 2010 Update: Covered in other risks. Pearlridge Station will require two full parcel acquisitions. Property appraisals will be conducted within the next 6 months. This could increase cost and have ROW impacts. The cost estimate allows ($xxxx) for this station. "Other site" is currently not an option - not in EIS and is more complicated than current site.
191	The aerial stations will have to be quite high off the ground and those with long spans above poor soils in the floodplain may attract greater than estimated construction costs	Sept. 2010 Update: Risk removed since it is now in the design. Geotechnical related foundation issues - Clarification on which stations this refers to is required
192	Airport developing expansion plans may add scope to the Guideway and station elements	Sept. 2010 Update: Not a Risk. Duplicate of Risk #42 Detailed planning and coordination is required for the interface of the Airport Station with airport parking, the inter island and international terminals, and new parking areas that are or will be under construction.
193	Geotechnical issues may impact China Town station foundations as more soils information is obtained.	Sept. 2010 Update: No longer a risk since covered in design. Chinatown station is near Nuuanu Stream and part of footing is planned in stream bed which will require dealing with poor soils, drainage, and construction challenges.

	K	L
189		This risk is not correctly defined. The use of moving block TC system carries far more risk to this issue than vehicle choice. Vehicle weight is a known specified unit and therefore the calculations should allow for this, there should be no risk, however the quantity of passenger loaded vehicles and the separation of these on the elevated structures is not defined and under the control of the fully automated TC system. Fixed block scenarios can be used to mitigate against this event, however moving block will not. With moving block single vechile weights are not sufficient alone for the calculations, having multiple units, with multiple stresses quite possibly between 2 supports. Vechile speeds are also defined and with a known headway typical vehicle run times can be determined which will give known velocities over elevated sections.
190		
191		
192		Airport expansion could possibly add to communications scope if mitigation of radio interference by airport required.
193		

	M	N	O	P	Q	R	S	T	U	V	W
189					0				X	0	
190					0				X	0	
191					0				X	0	
192					0				X	0	
193					0				X	0	

	X	Y	Z	AA	AB	AC	AD	AE	AF	AG	AH
189											
190											
191											
192											
193											

	A
194	102
195	143
196	146
197	165
198	180
199	181
200	188

	B	C	D	E	F	G	H
194	30.03	Heavy Maintenance Facility	DCR	CIV			MSF
195	40.03	Haz. mat'l, contam'd soil removal/mitigation, ground water treatments	UNP	ENV			City Center
196	40.04	Environmental mitigation, e.g. wetlands, historic/archeological, parks	DCR	ENV			Kam Highway
197	40.06	Pedestrian / bike access and accommodation, landscaping	LEG	COM			WOFH
198	40.08	Temporary Facilities and other indirect costs during construction	DCR	GEO			Airport
199	40.08	Temporary Facilities and other indirect costs during construction	DCR	CIV	E		Airport
200	40.08	Temporary Facilities and other indirect costs during construction	UNP	CIV	E		City Center

	I	J
194	Vehicle Basis of Design and functional sizing have not been fully developed, which could affect the MSF configuration.	Sept. 2010 Update: Not a Risk - All vehicles currently under consideration fit. June 2010 - forming single, double, triple car sets in yard (Also how passenger movement is accomplished through a 3 car set seems to be questionable when two end units are to be bi-directional operational as 'singles')
195	Potentially contaminated soils remain near the Dole Cannery.	Sept. 2010 Update: Duplicate. June 2010 update - Exact location needs to be confirmed and which segment this is in - Retain subject to further discussion and quantification
196	East of the H-1 and Kamehameha Hwy intersection, at the planned Park and Ride, flood hazard mitigation will be required due to the existing stream crossing this section.	Sept. 2010 Update: Not a risk. In current design. Wahava Stream@ Pearl Highlands Draft flood hazard studies have been performed and mitigation measures have been recommended (Proposed grading below Station and Park and Ride Facility to provide additional cross-sectional area to accommodate flood flows. Established minimum building low chord elevations to allow flood waters to flow under proposed Station and P&R structure without adverse impacts to existing base flood elevations. Could this turn into a re-classification as a dam or levy by the Corps of Engineers ?
197	Safe pedestrian access to Leeward Community College must be maintained.	Sept. 2010 Update: Not a Risk Updated : June 2010 part of WOFH contract works - safety issue ; Assume protection fencing both sides of guideway at grade through a 'school car park ?'
198	Construction is expected to be difficult through the Moanalua stream area due to the soft soils and limited space.	Duplicate - See Risk #46 and #47
199	Construction is expected to be difficult through the Keehi Interchange because of the high traffic volume through the complex interchange and limited space for construction.	Sept. 2010 Update: Duplicate This is a local issue - maintaining access is assumed to be possible but constraints on the Contractor need to be investigated to address the potential costs involved and any impact to the schedule
200	The alignment passes through an area that is constructed with existing retaining walls that have tie backs, so construction will need to be done while maintaining the integrity of the retaining walls.	Sept. 2010 Update: No longer a risk - review of as-builts have shown no such issues.

	K	L
194		It appears that this risk has already been removed and is no longer active on the register. Ref MSF track design geography compatible with selected vehicles.
195		
196		
197		
198		
199		
200		

	M	N	O	P	Q	R	S	T	U	V	W
194					0				X	0	
195					0				X	0	
196					0				X	0	
197					0				X	0	
198					0				X	0	
199					0				X	0	
200					0				X	0	

	X	Y	Z	AA	AB	AC	AD	AE	AF	AG	AH
194											
195											
196											
197											
198											
199											
200											

	A
201	199
202	209
203	213
204	215
205	216
206	225

	B	C	D	E	F	G	H
201	50.01	Train control and signals	CFR	CIV			Project wide
202	50.06	Fare collection system and equipment	DCR	SYS			Project wide
203	60.01	Purchase or lease of real estate	LEG	ROW			Project wide
204	60.01	Purchase or lease of real estate	DCR	ROW			Project wide
205	60.01	Purchase or lease of real estate	ROW	ROW			City Center
206	60.01	Purchase or lease of real estate	ROW	ROW			WOFH

	I	J
201	Likely mobilization/de-mobilization will be required between initial DB segment and subsequent segments will add costs to Project.	Sept. 2010 Update: No Longer a Risk - Activation of first short segment by 2013 as 'trial' section is no longer being considered. At the present time the first revenue opening will be in 2015. Once first opening it is planned to be a continuous cycle.
202	Fare Systems Technology has yet to be selected/finalized and may require future changes to guideway design - conduit sizes in segments, etc.	Sept. 2010 Update: Not a Risk. Study of combination of the Bus fare system with the train fare system is expected to be completed by Jan. 2011. Depending on the outcome, inclusion of fare gates may be required. The various fare gate infrastructure has been integrated into the systems design and estimate ex. conduits, camera locations, etc. So if fare gates are not used the structure will also be there for future use.
203	ROW Potential negative court judgments can occur. Condemnation may be required adding time and delaying access	Sept. 2010 Update: Covered in new ROW risks. All other properties will be monitored throughout the project and notification will be made of properties that may become a potential risk for condemnation. ROD date is required to accurately access schedule impacts - This needs expanding and to be more specific as to which Properties and / or local agreements as regards access, noise, construction working hours and so on may pose a threat to the project increasing costs and delaying the schedule
204	Lack of ROW resources to acquire property and easements to the schedule and contractual requirements may delay access and result in claims and additional costs	Sept. 2010 Update: Duplicate. See Risk #246. Resource technical capacity of the ROW Department to maintain schedule is a concern. Other than having authority and relative experience, staffing requirements and accountability with project requirements are unclear.
205	ROW acquisitions may require "economic remainder" judgments or full takes, particularly along Dillingham Boulevard.	Sept. 2010 Update: ROW impacts have been identified for the entire alignment and is currently not a risk.
206	In Waipahu from STN 680+00 to 695+00 ROW is required for single track into the yard lead. The allowance for this parcel in the cost estimate is _____.	No or minimal cost. Initial portion is City-owned land, and in the another portion, land rights will be obtained by Use and Occupancy Agreement between the City and DLNR (State agency).

	K	L
201		It appears that this risk has already been removed and is no longer active on the register. Ref sequential opening of line segments into revenue service from the initial shuttle service, and the associated staff mobilization required during transitions.
202		This risk is not correctly defined, it covers the guideway and the stations. The guideway duct sizing will not be an issue and the AFC physical layer will be fibers within a multicore run in planned ducts. The real risk is carried at the stations with the prefabrication of ducts and trunks to service predetermined AFC related equipment such as gate line barriers and CCTV cameras. Should the design change, gate requirements or local placing etc. This advanced integration effort will prove to be abortive expending funds. A decision on policy early Jan 2011, will assist in reducing this risk and the advanced specification of gate equipment types etc. can assist in reducing the probability of reworking the design and duct work to accommodate changes later on.
203		It is highly likely that there will be condemnation. This should be an allowance rather than a contingency.
204		
205		
206		

	M	N	O	P	Q	R	S	T	U	V	W
201					0				X	0	
202					0				X	0	
203					0				X	0	
204					0				X	0	
205					0				X	0	
206					0				X	0	

	X	Y	Z	AA	AB	AC	AD	AE	AF	AG	AH
201											
202											
203											
204											
205											
206											

	A
207	226
208	228
209	234
210	235
211	236
212	237
213	243

	B	C	D	E	F	G	H
207	60.01	Purchase or lease of real estate	ROW	ROW			WOFH
208	60.01	Purchase or lease of real estate	ROW	ROW			Kam Highway
209	60.01	Purchase or lease of real estate	ROW	ROW			Kam Highway
210	60.01	Purchase or lease of real estate	ROW	ROW			Kam Highway
211	60.01	Purchase or lease of real estate	ROW	ROW			Airport
212	60.01	Purchase or lease of real estate	ROW	ROW			Airport
213	60.01	Purchase or lease of real estate	ROW	ROW			City Center

	I	J
207	At the Proposed maintenance facility west of Leeward Comm. College, approximately STN 700+00 to 715+00 there may be issues with the ownership of land between the Navy, the City and DHHL. The current allowance for this parcel is _____.	The Navy has transferred fee ownership of the Drum Site to DHHL. Eventually, a Land Exchange will be negotiated between City and DHHL. The City and DHHL are currently drafting a License Agreement that will allow the City to construct, operate, and maintain
208	East of the H-1 and Kamehameha Hwy intersection, the planned Park and Ride property needs to be acquired. The current allowance for this property is _____.	Sept. 2010 Update: Covered in More Detailed ROW Risks for Pearl Highlands Station. All ten parcels that comprise the "Banana Patch" will be acquired in fee by the City. Property appraisals have been completed but will need to be updated within the next six months.
209	At the Salt Lake Blvd cut off at Aloha Stadium, the City and State negotiated agreement will be needed for the park and ride facility. This could cause delays in construction or a shift of alignment if ROW cannot be acquired or could increase cost.	Sept. 2010 Update: Possible Future Risk. Most likely acquisition by Use and Occupancy Agreement. Cost impact will be small or none. Could become a future risk when negotiations for permission to use property at Aloha Stadium Station begin.
210	On the makai side of Kamehameha Hwy adjacent to the Aloha Stadium station (approx STN 930 to 950), ROW acquisition from the Navy (DOD) will be required for the track. This could cause delays in construction or a shift of alignment if ROW cannot be acquired or could increase cost.	Sept. 2010 Update: Risk covered in more detailed ROW Risks.
211	Near the Makalapa Station, ewa of STN 1005 to the Makalapa St, there may be ROW acquisition required of Pearl Harbor Navy Base to accommodate a system substation. This could cause delays in construction or a shift of alignment if ROW cannot be acquired or could increase cost.	Sept. 2010 Update: Risk covered in more detailed ROW Risks.
212	From STN 1060 to Elliot Street, ROW acquisition will be required to accommodate the alignment. This could cause delays in construction or a shift of alignment if ROW cannot be acquired or could increase cost.	Sept. 2010 Update: Risk covered in more detailed ROW Risks.
213	Both sides of Aloha Tower station have right of way challenges. Mauka side is owned by HECO and they are unlikely to give up ROW. Makai side is an office building who's owners may be concerned about the station-related pedestrian traffic on their proper	Comment Only - Not a Risk

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213		This is noted as “not a risk” but it seems to be one since the property is expensive and likely to end up in condemnation.

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207					0				X	0	
208					0				X	0	
209					0				X	0	
210					0				X	0	
211					0				X	0	
212					0				X	0	
213					0				X	0	

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215	278
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217	280
218	283
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221	303
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214	70.02	Heavy Rail	FUN	SYS			Core Systems Project Wide
215	60.02	Relocation of existing households and businesses	POL	ROW			City Center
216	60.01	Purchase or lease of real estate	POL	ROW			City Center
217	60.02	Relocation of existing households and businesses	POL	ROW			City Center
218	80.01	Preliminary Engineering	UNP	COM			Project wide
219	90.00	Unallocated - all SCC's	UNP	GEN			Project wide
220	90.00	Unallocated - all SCC's	DCR	GEN			WOFH
221	90.00	Unallocated - all SCC's	DCR	GEN	E		WOFH
222	90.00	Unallocated - all SCC's	DCR	GEN	B		WOFH

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214	Core systems bids may be higher than expected.	Sept. 2010 Update: Covered in Market Risks since it is not yet awarded. Updated June 2010 - Combining the Vehicles and Systems into a single contract may lower the number of potential bids that can be received and could limit competition for future procurements. This could be a 'market' issue
215	Unauthorized homeless "condos" exist under the interchange which may require special City and County involvement to handle the situation.	Sept. 2010 Update: Future Risk. This could have access impacts if not progressed
216	HCDA (state agency) has interest / ownership of this property and coordination may be difficult.	Sept. 2010 Update: Not a Risk. Lack of ROW resources to acquire property and easements to the schedule and contractual requirements may delay access and result in claims and additional costs
217	General Growth Properties owns this area and coordination may be difficult due to their existing redevelopment plans.	Sept. 2010 Update: Possible Future Risk
218	Project management, document control and project controls system in 'Contract Manager' may prove overly complex, cause information inconsistencies and delays in responses to requests for information exposing the City to claims.	GEC is in works to affect implementation contract management.
219	The availability of skilled and unskilled labor could increase costs.	Sept. 2010 Update: Not a Risk at this time. Contractors will bring their key skilled foreman and will have this in their bids. There currently is not a shortage in the state.
220	If Kiewit is not awarded Segment 3 (Kamehameha Guideway DB) they may be much more aggressive in equitable adjustment negotiations for delays associated with WOFH contract.	Sept. 2010 Update: Risk Covered in Claims from NTP Delays. To be evaluated based on more aggressive negotiations if Kiewit see they are not as they are hoping to be awarded the first three segments
221	An injunction resulting from a legal challenge may take place after ROD, which would stop construction and cause delays.	Duplicate.
222	There may be insufficient time in the schedule to prepare LONP submissions.	Sept. 2010 Update: No longer a Risk. If ROD is obtained in August 2010 there is insufficient time in the schedule to prepare LONP submissions without further delaying the NTP process.

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214		Awareness of potentially higher than estimated bids is not the only issue - potential change orders regarding a multitude of undefined or less than clear definifition and expectation are always a risk for RFP type contracts. This is particularly true for a package of systems elements as well as operational/maintenance elements. Has an analysis been done to reflect potential contingencies for change orders for the unknowns and potential interface issues related to this CSC DBOM contract?
215		Depending on resolution, may present public affairs and public safety issues. Consultation with Police Department may be necessary, and there may be a need for special requirements to safeguard the site and any materials stored there.
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214					0				X	0	
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218					0				X	0	
219					0				X	0	
220					0				X	0	
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222					0				X	0	

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223	90.00	Unallocated - all SCC's	DCR	GEN	C		WOFH
224	10.04	Guideway: Aerial structure	DCR	GEN			WOFH
225	90.00	Unallocated - all SCC's	DCR	GEN			WOFH
226	90.00	Unallocated - all SCC's	DCR	GEN			WOFH
227	90.00	Unallocated - all SCC's	DCR	GEN			WOFH
228	10.04	Guideway: Aerial structure	DCR	GEN			WOFH
229	40.02	Site Utilities, Utility Relocation	POL	UTI			WOFH

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223	Definition of 'materials in short supply" is widened in 're-negotiations of contract' exposing RTD to additional 'retained risk'	Sept. 2010 Update: Not a Risk Other materials, particularly those related to systems (e.g. concrete aggregate, concrete admixtures, bentonite slurry) might impact this contract
224	Approval of Street closures / staging may not be in accordance with Kiewit's stated assumptions at Bid.	Sept. 2010 Update: Duplicate. Minimal Risk since a lot of coordination with HDOT has already occurred.
225	City may not provide responses to Kiewit's submittals in a timely manner in accordance with contract delaying final design detailing.	Sept. 2010 Update: Covered Elsewhere. Low risk on WOFH contract - More concerned about possible changes in core systems designs and possible knock on impact to conduits and fixings within PCC guideway segments
226	ROW may not be available to schedule (due in part to delayed ROD) and delay Kiewit start of construction date or intermediate access dates once commenced.	Sept. 2010 Update: Covered Elsewhere. This could result in out of sequence working and claims and subsequent acceleration measures ; no allowance in current schedule for legal expropriation however because of delay in award of this contract and period between construction access in 'high risk property areas' enough time exists in schedule to obtain access through courts if required without delaying the contractor
227	Insufficient City labor to process all ROW acquisitions to meet schedule access requirements	Sept. 2010 Update: Duplicate - See Risk in ROW City only has one ROW employee however the expectation is that outside resources will be hired - additional unbudgeted costs possible and delays but not believed to impact this contract
228	Vehicle weight / loadings from bid process exceed design criteria which Kiewit bid has been based upon increasing structural components (Guideway and / or foundations)	Sept. 2010 Update: No longer a risk Impacts foundations designs ; vehicles, systems all required 336 days after NTP.
229	Electrical Utilities may all be relocated underground rather than on new overhead poles.	Sept. 2010 Update: Not a risk in WOFH Contract may be in other segments. Tele Conf June 17th 2010: Risk reflects undergrounding of electrical cables which the Project has said is not in the budget or scope and would be an extra if the city / HECO insisted on this.

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228		This risk should remain active. It is still a risk due to the issue of the possibility of using moving block signaling. This risk relates to Risk 73.
229		This should be considered a betterment and thus costs shared with HECO. This relates to the Risks associated with new supply upgrades and modifications to existing supply grid/network. This work should all be pre-determined prior to entering FD. HECO should be signed up under an MCA for this work and it should carry no risk. Any additional work arising from the re-routing of services should be costed in the estimate for FD at minimal contingency.

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223					0				X	0	
224					0				X	0	
225					0				X	0	
226					0				X	0	
227					0				X	0	
228					0				X	0	
229					0				X	0	

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230	327
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235	341
236	345
237	346

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230	90.00	Unallocated - all SCC's	DCR	GEN			WOFH
231	90.00	Unallocated - all SCC's	DCR	GEN			WOFH
232	90.00	Unallocated - all SCC's	UNP	GEN			Project wide
233	90.00	Unallocated - all SCC's	FUN	GEN			Project wide
234	90.00	Unallocated - all SCC's	FUN	GEN			Project wide
235	90.00	Unallocated - all SCC's	FUN	GEN			Project wide
236	80.06	Legal; Permits; Review Fees by other agencies, cities, etc.	UNP	COM	E		Project wide
237	30.03	Heavy Maintenance Facility	UNP	ENV			MSF

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230	Conditions of contract and requirements of City may not be fully understood by HDOT.	Sept. 2010 Update: Covered elsewhere. Could be possible disagreements on approvals and requirements and definitions of 'taking over streets and associated maintenance' during the contract works.
231	Performance Bond - set at 50% ; liability exists if contractor defaults to City	Sept. 2010 Update: Not a risk. City may have to pick up completion costs over Bond - Bond may not cover "all" circumstances ; however City understood to have been assured 50% Bond would cover costs and FTA now insisting on 100% Bonding capacity
232	Labor agreement impacts cost of bid (no strikes, abide to Davis Bacon wage rates etc)	Sept. 2010 Update: Not a Risk - covered in estimate. Strikes etc could impact mainland suppliers as not under a local labor agreement
233	Commodity inflation spikes above projected trend's in one or more trades "prior" to executing fixed price contract	Sept. 2010 Update: Duplicate. Inflation issues
234	Delays to other contracts due to force majeure events	Sept 2010 Update: Covered in weather risk #294 Hurricanes, Volcanic eruptions and / or earthquakes preventing materials etc from mainland arriving in a timely manner, lost cargoes in storms, emergency clean up operations taking precedence over project demands following weather events
235	Definition of 'materials in short supply" is widened due to unforeseen events	Sept. 2010 Update: Duplicate Other materials, particularly those related to systems (e.g. copper wire etc) might be classed as 'materials in short supply'
236	Insufficient data collected by City to defend/refute claims from Design Build Contractors.	Sept. 2010 Update: Covered Elsewhere in Claims Risks. Notice Provision - Contractor needs to notify city that there is a changed condition which would then put their own inspectors out on site.
237	A significant ancient burial ground may be found during pot holing which could result in a station and associated alignment entry and exit points having to be changed	Sept. 2010 Update: Not a Risk at MSF - Based on current information from burial council.

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231					0				X	0	
232					0				X	0	
233					0				X	0	
234					0				X	0	
235					0				X	0	
236					0				X	0	
237					0				X	0	

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239	349
240	357
241	359

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238	30.03	Heavy Maintenance Facility	DCR	GEN	A		MSF
239	40.08	Temporary Facilities and other indirect costs during construction	DCR	CIV			Kam Highway
240	40.02	Site Utilities, Utility Relocation	DCR	UTI			City Center
241	40.02	Site Utilities, Utility Relocation	UNP	UTI			Project wide

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238	The Core systems contractor may want the MSF configuration changed.	Sept. 2010 Update: Not a Risk - Current discussions with proposers have been ok with MSF and could even result in a credit.
239	If HDOT works on H1 freeway coincide with Kamehameha guideway works more stringent traffic staging may be imposed on HHCTC Contractor	Sept. 2010 Update: Duplicate. See Risk # 32 The Honolulu Department of Transport works on the H1 freeway may coincide with the Kamehameha guideway works resulting in significant traffic congestion.
240	Costs for Utility relocations may increase if Utility plans have errors or omissions greater than Contract stipulation on Kamehameha Highway.	Sept. 2010 Update: Duplicate - See Risk #354 Tele Conf June 17th 2010: Total cost of Utilities was estimated at $111 Million split $14 million for wet (water, sewer, gas, fuel) and $ 97 Million Electrical and Telecom most of which were currently above ground relocations but significant ducting of Utilities is proposed. Costs associated with additional traffic management restrictions, additional highway resurfacing and general schedule impact if existing underground abandoned utilities had to be removed could be extremely significant in street repairs and associated schedule and productivity disruption to main works but noting that these could be removed concurrent with new works (see associated risk on City Center Guideway contract)
241	Cost exposure from unexpected utility betterment. (Ex. Underground piping quality may be degraded and require extensive replacement which may not all be offset as betterment)	New Risk in Sept. 2010 Update. Risk Split from #359 into various segments. See Risks #461, 462,463,464 and 465 The extent of replacements can also change for example tying in a new sewer at a manhole assumed to be structurally sound but upon excavation for connection is found to be unstable, not large enough to accept the new connection (perhaps under sized in the first place) or other unforeseen issues. Whether these and other such additional scope is classed as Betterment is sometimes questionable and some cost sharing is common.

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238		This remains a risk as systems within the MSF will be installed by the CSC. The civil design must be compatible with the CSC systems requirements at an integration level for seamless installation to take place. MSF and CSC contractors must have a strong relationship across contracts. This does carry risk. The CSC must inform the MSF designer of any requirements ahead of time not to impact the MSF schedule to which he is being held accountable. This will require close management and control across this contractual boundary through the IMP. This medium level risk should not be closed out.
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241		This risk should be addressed through the MCA's. degraded conditions are not covered under HHCTC funds. This is true and 100% betterment if the condition of utility is being relocated on a like for like basis. Costs split between the HHCTCP and utility provider so that betterment portion belongs exclusively to the provider and cost of relocation to the HHCTCP.

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238					0				X	0	
239					0				X	0	
240					0				X	0	
241					0				X	0	

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239											
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242	361
243	365
244	440
245	463
246	900
247	901
248	902
249	903
250	904
251	905
252	

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242	40.02	Site Utilities, Utility Relocation	UNP	UTI			Project wide
243	40.02	Site Utilities, Utility Relocation	DCR	UTI			Project wide
244	50.01	Train control and signals	CFR	SYS	A		Project wide
245	40.02	Site Utilities, Utility Relocation	UNP	UTI	D		MSF
246	60.01	Purchase or lease of real estate	ROW	ROW			Airport
247	60.01	Purchase or lease of real estate	ROW	ROW			Airport
248	60.01	Purchase or lease of real estate	ROW	ROW			Airport
249	60.01	Purchase or lease of real estate	ROW	ROW			City Center
250	60.01	Purchase or lease of real estate	ROW	ROW			City Center
251	60.01	Purchase or lease of real estate	ROW	ROW			Kam Highway
252							

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242	Civil guideway or station works may be delayed / impacted by street works associated with removal of redundant utility installations.	Sept. 2010 Update: Covered Elsewhere June 17th 2010 - Unclear if Schedule of Utility relocations will overlap with the Guideway or stations civil works - street works associated with removal of redundant relocated existing utilities may over lap and cause delays to guideway and / or station works (applies specifically to Airport and City Centre DBB Contracts).
243	Maintaining uninterruptable supplies to existing property owners of gas, water, sewer, telecoms and electricity during Utility relocations may be more challenging than anticipated requiring significant temporary supplies to be installed during new hook up	Sept. 2010 Update: Will be required by all contractors and has been included in rates of estimate. This has been an issue on other projects particularly with water and sewer services the consequence of which has been to slow progress of civil works and require streets to remain open to excavations longer than expected. City Center buildings with large services can be particularly problematic
244	Fully automated storage yard to be added which may increase costs to systems contract.	New Risk in Sept. 2010 Update. No issues with track as switches and point motors already fully automated but could add $250k + to software systems contract
245	Cost exposure from unexpected utility betterment. (Ex. Underground piping quality may be degraded and require extensive replacement which may not all be offset as betterment)	NOT A RISK FOR MSF. New Risk in Sept. 2010 Update. Risk Split from #359 into various segments. See Risks #461, 462,464 and 465
246	Process to obtain Navy property at Pearl Harbor Station could be longer than anticipated.	Sept. 2010 - Possible Future Risk. Renumber when it becomes active. Cannot rank at this time because there is no ROW schedule for this yet and it is in the 3rd segment.
247	Businesses at Uelena drive may require more relocations than scheduled.	Sept. 2010 - Possible Future Risk. Renumber when it becomes active. Cannot rank at this time because there is no ROW schedule for this yet and it is in the 3rd segment.
248	Waiwai property may require a complete buy out and relocation which would cause additional time and cost to buy out entire property. (Alert and Alarm Property)	Sept. 2010 - Possible Future Risk. Renumber when it becomes active.
249	HECO property at Downtown Station may become an issue (Currently need to acquire just a storage space)	Sept. 2010 - Possible Future Risk. Renumber when it becomes active.
250	Bishop Estates at Civic Center Station may be difficult to integrate with project and work with.	Sept. 2010 - Possible Future Risk. Renumber when it becomes active. Bishop Estates do not have a transit plan in their master redevelopment plan and have been known to be difficult to work with.
251	Property at Pearlridge Station may require condemnation which would require more time than scheduled. (Would only impact station, not guideway)	Sept. 2010 - Possible Future Risk. Renumber when it becomes active.
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